TECHNOLOGY DEPT.

ELECTRICAL REVIEW

FRIDAY
OVEMBER 1958

WEEKLY
PRICE 1s 6d

FERRANTI TRANSFORMERS 1890 TO 1958

FIRST IN THE FIELD

In the British Electrical Industry, Ferranti transformers are always first in the field, thus satisfying the ever increasing demand for electric power.
The skill of Ferranti engineers over a period of more than 65 years has resulted in the award of contracts for the supply of transformers of the highest voltage and rating for the world's largest electric power projects.

F FERRANTI

Specify FERRANTI transformers famous throughout the world

FERRANTI LTD · HOLLINWOOD · LANCS Tel: FAilsworth 2000
London Office: KERN HOUSE, 36 KINGSWAY, W.C.2 Tel: TEMple Bar 6666

Keep your Sales moving!

WITH SWAN BRAND

ELECTRICAL APPLIANCES & ALUMINIUM HOLLOWARE

Big Space **ADVERTISING** in national newspapers is creating increased sales for SWAN BRAND

COMMERCIAL T.V Coverage is your liveliest dealer aid— keep up your stocks to meet demand

Bulpitt & Sons Ltd., Birmingham 18

H-W.449

Q

A

What does it cost to drive a 10 kW Generator from a 14/22 h.p. Armstrong Siddeley Air Cooled Diesel?

$0.01385 (1.175d.) per kW/hour*

ACTUAL COSTS FOR
2606½ HOURS RUNNING WERE:

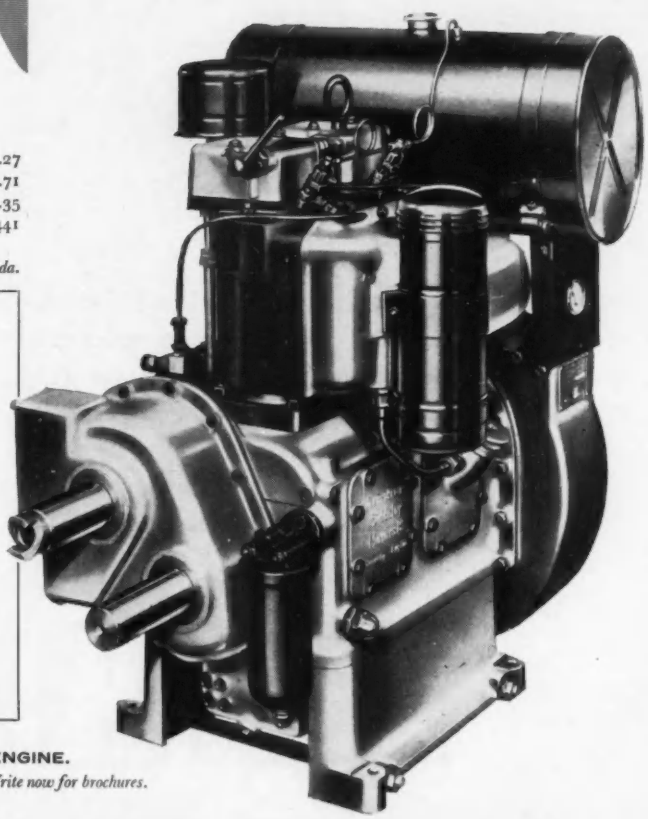
Diesel fuel (less tax : 1178 gals.)	$259.27
Lubricating oil, filters, etc.	$81.71
Spare parts (fuel filter assembly)	$20.35
Fuel consumption (Gals./Hour)	0.441

**Figure supplied by Gt. Raymond Paper Co. of Lac Brûlé, Canada.*

YEARS OF KNOW-HOW: The diesel engines are manufactured with the same precision as Armstrong Siddeley's world-famous aero engines.

MATERIAL-CHECKED: Armstrong Siddeley experts regularly visit suppliers of materials and components to check on their quality controls.

PRODUCTION-CHECKED: As well as the standard bench test, which every engine undergoes, far more extensive tests are regularly made on engines taken at random from the production lines and all ASM diesels are approved by Lloyds and the Dutch Bureau Veritas.



THERE IS NO MORE RELIABLE DIESEL ENGINE.
Three models: 6-11 h.p., 14-22 h.p., 20-33 h.p. *Write now for brochures.*

ARMSTRONG SIDDELEY AIR COOLED DIESELS

ARMSTRONG SIDDELEY MOTORS Coventry and Brockworth / ENGINE BUILDERS TO THE WORLD

A

Comprehensive and Conclusive!

The inside story on FLOODLIGHTING Equipment!

Yes! The R.E.A.L. Catalogue of Flood Lanterns (No. P 5705) provides the answer to practically every floodlighting problem, for within its fully illustrated pages, you will find a most comprehensive range of equipment forming a complete survey of all that is best in new and well-proven Lanterns. Send NOW for this valuable reference book.

REAL

R.E.A.L. *is the registered trade mark of*
ROWLANDS ELECTRICAL ACCESSORIES LTD., R.E.A.L. WORKS, BIRMINGHAM 18

SCREW, BOLT or CAVITY FIXINGS

the Speediest way is best!

MODERN BUILDING MATERIALS can be a veritable nightmare to the man who has to deal with the problem of making SPEEDY, PERMANENTLY SECURE FIXINGS having either LIGHT or HEAVY LOADING CAPACITY at an economic cost.

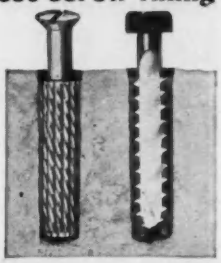
In the RAWLPLUG RANGE there are 21 different types of Fixing Devices, with a tremendous variety of applications. They provide the complete answer to every fixing problem in every kind of material. THE RAWLPLUG RANGE also includes 14 different types of tools for hole boring.

RAWLPLUGS WALL PLUGS

The World's Largest Manufacturers of Fixing Devices

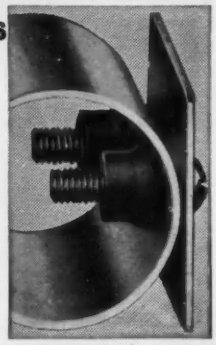
The world's speediest screw fixing

Rawlplugs make firm screw fixings in brick, tiles, cement, stone, etc., in a fraction of the time taken by any other method. Drill the material, insert the Rawlplug, screw up—it's as simple as that! Safe, permanent, and completely reliable in any climate. For all screw sizes up to ¾" coach screws.



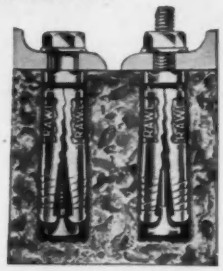
For Cavity fixings

For almost impossible jobs use the Rawlnut. (You can even make a fixing to a pipe). The tapped nut in the end of the rubber bush is drawn up to the reverse face of the material by turning the screw. The result is an airtight, watertight, vibration-proof fixing of enormous strength. For thin plastic, metal, wallboard and hollow pot, etc., it is invaluable.



Bolt it down in minutes!

For light or heavy bolting jobs, no other method even *begins* to approach Rawlbolts for strength, ease and speed. Rawlbolts are a *dry* fixing, they grip at once by expansion—no cold chiselling, no grouting in, no waiting for cement to harden. In all bolt diameters up to 1" in either loose bolt or bolt projecting types.



For casting in

Rawlplug CEMENT-IN-SOCKETS are designed to give maximum anchoring value for ¼" to 1" Whitworth bolts. They are ideal for "in-situ" work where the location of Bolt and Socket can be predetermined. Manifold uses for providing anchoring points for all classes of concrete constructional work, including curtain walling, slabs and similar units.

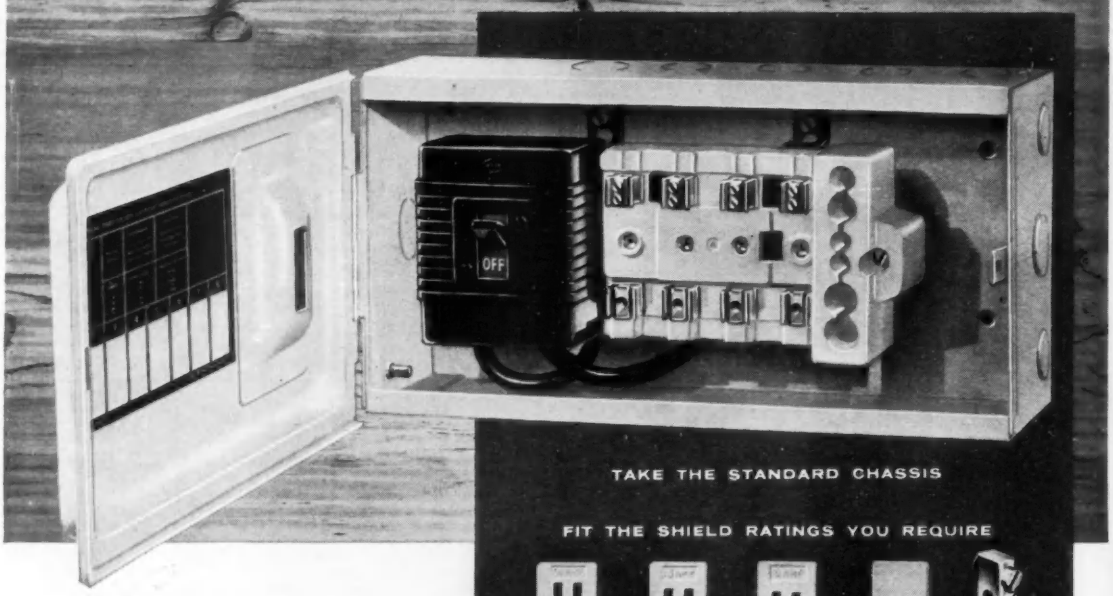
For Speed and Strength!

DESB A

HAVE YOU A FIXING PROBLEM? ***For FREE TECHNICAL SERVICE send full details to:—***

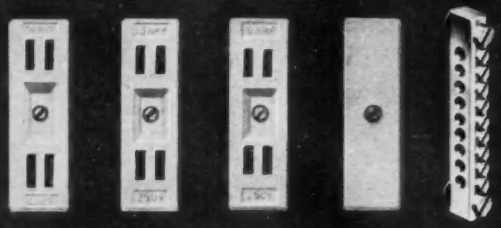
THE RAWLPLUG COMPANY LIMITED • CROMWELL ROAD • LONDON • S.W.7

MEMERA the unit which set a new high standard in the industry



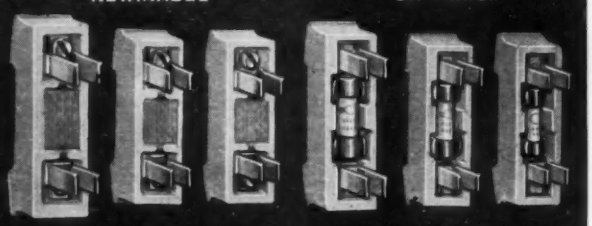
TAKE THE STANDARD CHASSIS

FIT THE SHIELD RATINGS YOU REQUIRE



ONLY THE RIGHT FUSE HANDLE RATINGS WILL THEN FIT

REWIRABLE OR H.R.C.



30 AMP 15 AMP 5 AMP 30 AMP 15 AMP 5 AMP

If the job calls for unusual fuse combinations, it's no trouble at all with Memera. No other equipment gives you the same versatility as Memera.

The system is so delightfully simple. The chassis is the same for all combinations. Just fit the appropriate shields to suit the fuse ratings you need for the job. Once these are fitted, only the correctly rated fuse handles can be inserted.

And of course with Memera there is the big advantage that you can use either rewirable or H.R.C. fuses.

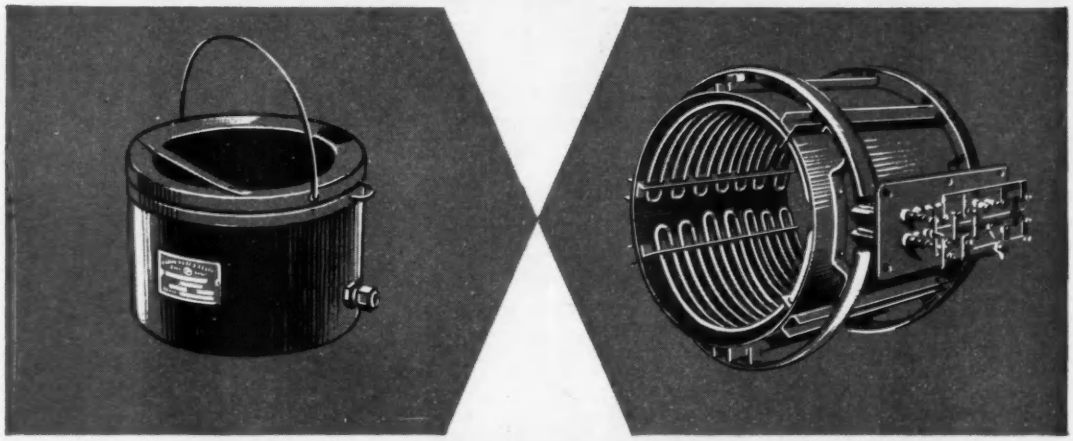
SILVER AND BRONZE MEDALS
BRUSSELS WORLD EXHIBITION 1958
Engineering Centre, Collective Exhibit

MEM MIDLAND ELECTRIC MANUFACTURING CO. LTD. · TYSELEY · BIRMINGHAM 11

Applying the right heat in the right place

with BTH 'PYROBAR' PROCESS HEATERS

Electric heating generated and applied locally offers the advantages of simplicity, speed, efficiency and economy in hundreds of industrial processes, large and small. Five basic types of BTH 'Pyrobar' electric heater are available to deal with almost any application. Built to exacting standards, they are virtually indestructible in service. Standard shapes and sizes are delivered from stock, or special heaters can be formed during manufacture to almost any desired shape. Alternatively 'Pyrobar' heaters can be supplied in straight lengths, and bent cold on site to suit the application.



FROM GLUE POT — TO EXTRUSION PRESS

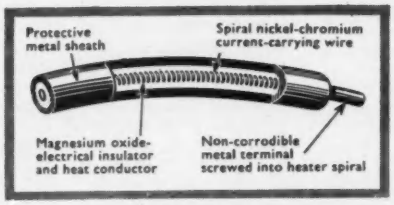
Study these features

* Specially designed for dependable service and long life in industrial processes
* High application efficiency—virtually 100 per cent. with immersion heaters
* No trouble with burners or furnace linings
* Accurate. Readily adapted to automatic temperature control, making skilled supervision unnecessary
* Low fire risk can cut insurance premiums
* No smoke, fumes, dirt or grease

Write for further details. Leaflet G14031, showing the wide range of heaters and their applications, will be sent on request.

Types available :

GILLED · FINNED · CAST-IN
IMMERSION · RADIANT


Protective metal sheath
Spiral nickel-chromium current-carrying wire
Magnesium oxide-electrical insulator and heat conductor
Non-corrodible metal terminal screwed into heater spiral

Section of 'Pyrobar' element

BRITISH THOMSON-HOUSTON

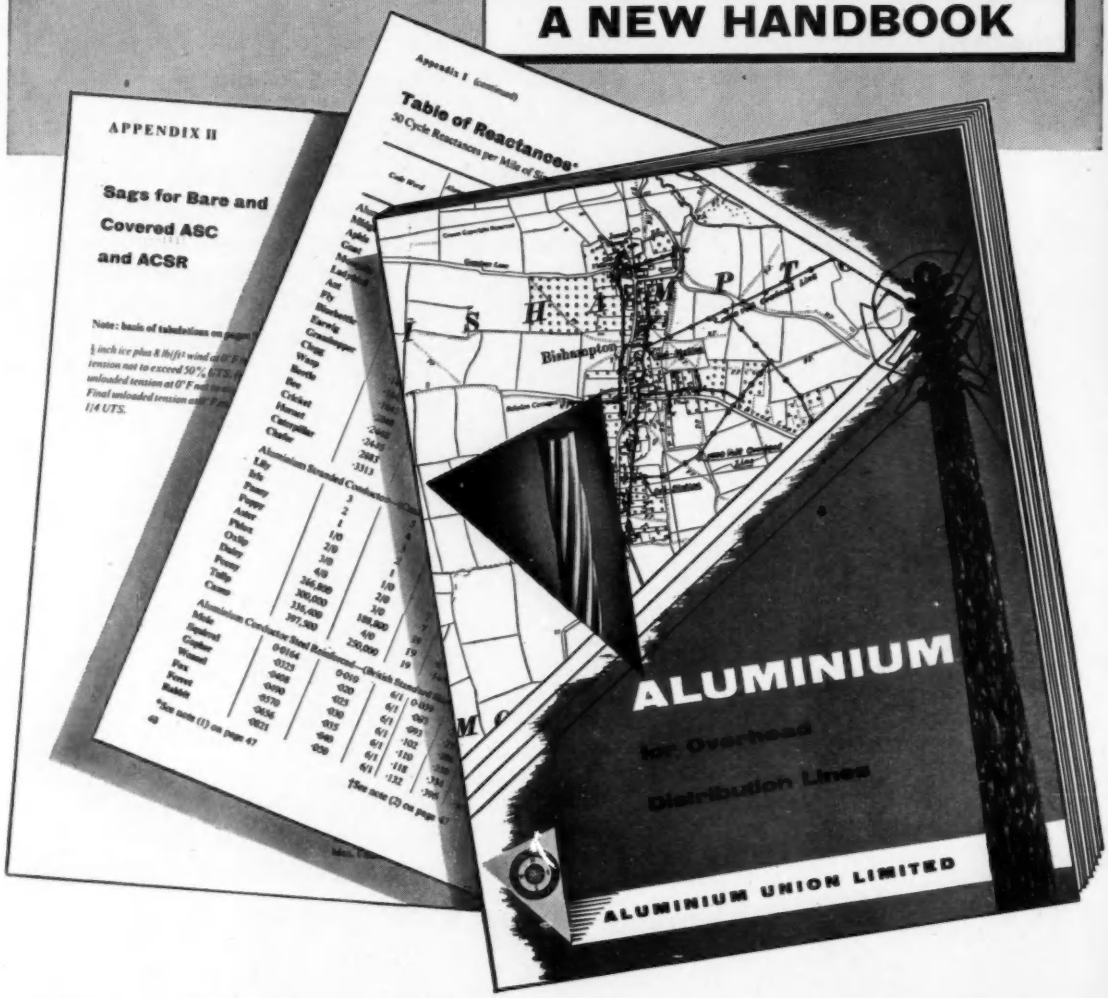
THE BRITISH THOMSON-HOUSTON COMPANY LIMITED · RUGBY · ENGLAND

an A.E.I. Company

A5224

ALUMINIUM for Overhead Distribution Lines

A NEW HANDBOOK



Copies of the book are obtainable free on request from Aluminium Union Limited, or our Associated Company in Great Britain, Northern Aluminium Company Limited, Development Division, Southam Road, Banbury, Oxfordshire.

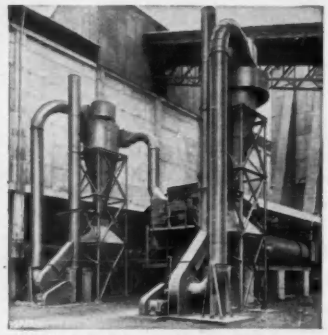
The most widely used material for overhead electrical transmission and distribution conductors is aluminium. High conductivity, high strength, light weight and resistance to atmospheric attack makes aluminium conductors the first choice of Electricity Authorities in all parts of the world.

The new 58-page illustrated handbook we have prepared gives full details of the advantages of aluminium, as well as describing suitable methods for selection and installation of aluminium conductors for rural and urban Overhead Distribution Lines. Concerned particularly with two classes of overhead line work—Rural Distribution and Urban Feeders up to 33kV—and Urban and Rural Overhead Secondaries in the voltage range of 110-660 volts—the handbook will assist utilities, electrical authorities, engineers and linesmen to make the most of the special characteristics of aluminium conductors for lines of these types.

Aluminium Union Limited

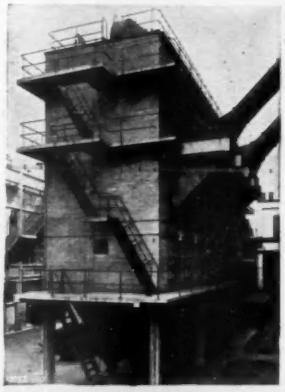
(*Incorporated in Canada*)

THE ADELPHI · JOHN ADAM STREET · LONDON, W.C.2 · OFFICES, ASSOCIATED COMPANIES AND AGENTS THROUGHOUT THE WORLD. *An Aluminium Limited Company.*



CYCLONES — for collecting a wide range of dusts of relatively coarse size.

SCRUBBERS — for arresting all types of dust — particularly those of an explosive or inflammable nature.



ELECTROSTATIC PRECIPITATORS — the most efficient method of collecting dust and fume.

Process Dust...

the arch-enemy of men and machines

can be controlled by STURTEVANT PLANT

with collectors of every type

The extensive technical knowledge and resources of the company are based on almost seventy years' experience in controlling every conceivable type of dust.

The characteristics, problems and control of Dust are outlined in our technical publication U2204.

STURTEVANT ENGINEERING CO. LTD.
Southern House, Cannon Street, London, E.C.4

AUSTRALIA

STURTEVANT ENGINEERING CO. (AUSTRALASIA) LTD. 400, SUSSEX STREET, SYDNEY, N.S.W.

DOWN COME COSTS

AS *Nylon* GOES TO WORK

Nylon work wear saves money not only on a cost-for-life basis but also indirectly by reducing running costs, and by increasing efficiency all round. Overalls, Clean Area Suits, Bib and Brace, Boiler Suits, Warehouse Coats—all are available now in nylon. All have these important advantages :—

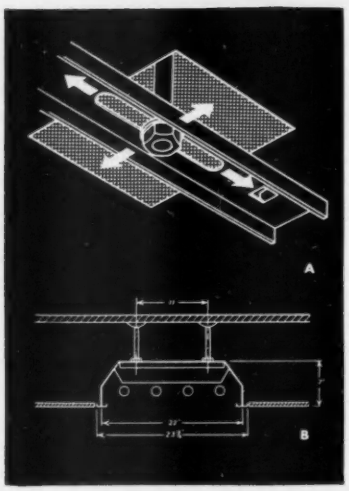
Easy laundering **Lint-free** **Better hygiene**
Shrink-proof **Longer, smarter wear** **Light and comfortable**

Nylon WORK WEAR — for further information, please write to
BRITISH NYLON SPINNERS LIMITED,
68 Knightsbridge, London, S.W.1.

B Nylon S

atlas leads in lighting / **suggestions for lighting modular ceilings**

atlas modulite



Atlas Modulite fluorescent fittings are designed for use in all types of modular ceilings. They preserve the clean, unbroken appearance of the ceiling, permit complete flexibility in design and are singularly easy to install and maintain.

Two series of fittings exist, the "HM" in lengths from 2 ft. to 8 ft. for use on the 2 ft. module, and "GT" (2 ft. to 6 ft.) for the 1 ft. grid. In both, general wiring can be completed prior to installation of the false ceiling. All fittings fit neatly between joists and ceiling boards: adjustable suspensions (a) make it easy to line them up with conduit downdrops and the ceiling level; and once installed, diffusers, tubes, lampholders and gear can be reached from the underside for maintenance in a matter of moments—as shown by illustration (b).

Complementary to the "HM" and "GT" series are Atlas GIQ (Wafer) fittings—extremely shallow fittings for use where lack of space prohibits recessing of a fitting chassis.

Atlas Lighting Engineers are available for consultation at any time. and will gladly call by appointment.

ATLAS LIGHTING LIMITED, 233 Shaftesbury Avenue, London, W.C.2. A subsidiary company of Thorn Electrical Industries Ltd

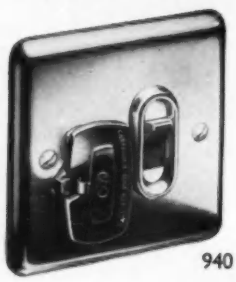
MK

To meet IEE Regulation 314

Fused SPUR-BOXES *with DP switches*

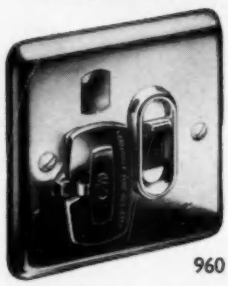
MK160DHB

WITHOUT PILOT-LAMP



940

WITH PILOT-LAMP



960

941

961

942

962

THIS NEW RANGE is designed to give a neat and simple solution to the problem of installing fixed appliances to conform with I E E Regulation 314. The double pole switch disconnects the appliance from all live supply conductors. The fuse-carrier contains a 13 amp cartridge fuse-link to BS 1362. Flush types are made with moulded plates finished brown or ivory, and brass plates finished BMA or matt chrome. Surface metalclad units have steel boxes and cover plates finished aluminium stove enamel. All types are available with or without pilot-lamps.

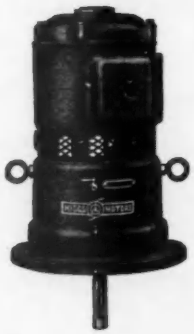
Flush insulated units can be converted for surface mounting by using the conversion box *List No.* 2030. All flush spur-boxes have 2¼" fixing centres for mounting in BS 1363 boxes. Write for leaflet 247.

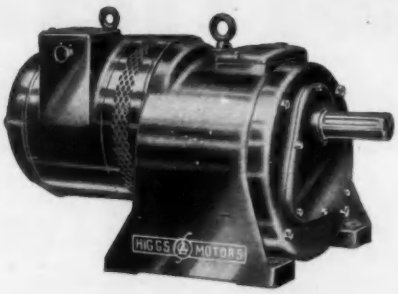
MK

...the mark of progress

M. K. Electric Limited, Wakefield Street, London N.18 Edmonton 5151

GEARED MOTOR UNITS





ALL YOUR MOTOR REQUIREMENTS

PRICES — COMPETITIVE
DELIVERY — STANDARD STOCK

TRADE MARK
HIGGS MOTORS LTD
MANAGING DIRECTOR DAVID C.Y. HIGGS, A.M.I.E.E.
BIRMINGHAM 6 ENGLAND

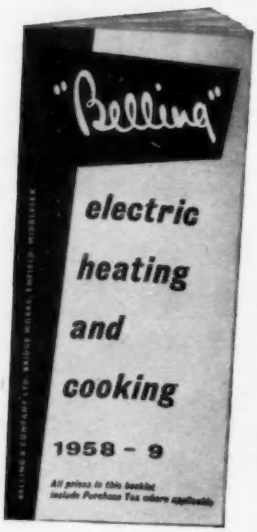
AGENTS AND BRANCHES COVER THE WORLD

Belling announce a new small catalogue

Here's our latest idea to bring you even more Belling sales. It's a beautifully produced miniature version of our standard catalogue.

- Small enough to post in an ordinary foolscap envelope
- 24 pages in full colour—from real colour photographs
- Contains full details of all Belling products

Feature these new miniature catalogues in your window display—they're bound to attract enquiries. Supplies by return of post.



for Warmth and Comfort

Instant clean heat at the touch of a switch . . . no dust or dirt, no fumes or smoke . . . no grate to clean, no chimneys to sweep . . . electricity is the answer to all your heating problems this winter.

There are dozens of different Belling electric fires and convectors. Come and see them in our showroom.

BELLING HOTSPUR FIRE
1 kW £3 10s 2d
2 kW £4 0s 0d
BELLING COUNTESS
2kW £7 2s 6d
3kW £8 4s 9d
"Belling"
BELLING ZEPHYR CONVECTOR
1, 2 and 3kW models from £11 11s 10d
BELLING PRINCESS
2kW with coal effect £13 10s 3d
with logeffect £13 8s 6d
3kW size also available.

see the Belling range at

BROWN & CO. LTD

YOUR BELLING DEALER

220 High Road, CROTHWELL

FREE DEALER BLOCKS

This is a small reproduction of a new 6 in. double column dealer block showing 4 Belling best sellers. Use it in your local advertising and let all the prospective buyers in your neighbourhood know you are their Belling stockist. We'll be only too pleased to supply you with a block free of charge.

STOP PRESS!

Our latest big advertisements in the National Press are pulling in tens of thousands of requests for catalogues every week. And every catalogue we send out means business for a Belling stockist somewhere. Display Belling fires in your window and make sure you get your share.

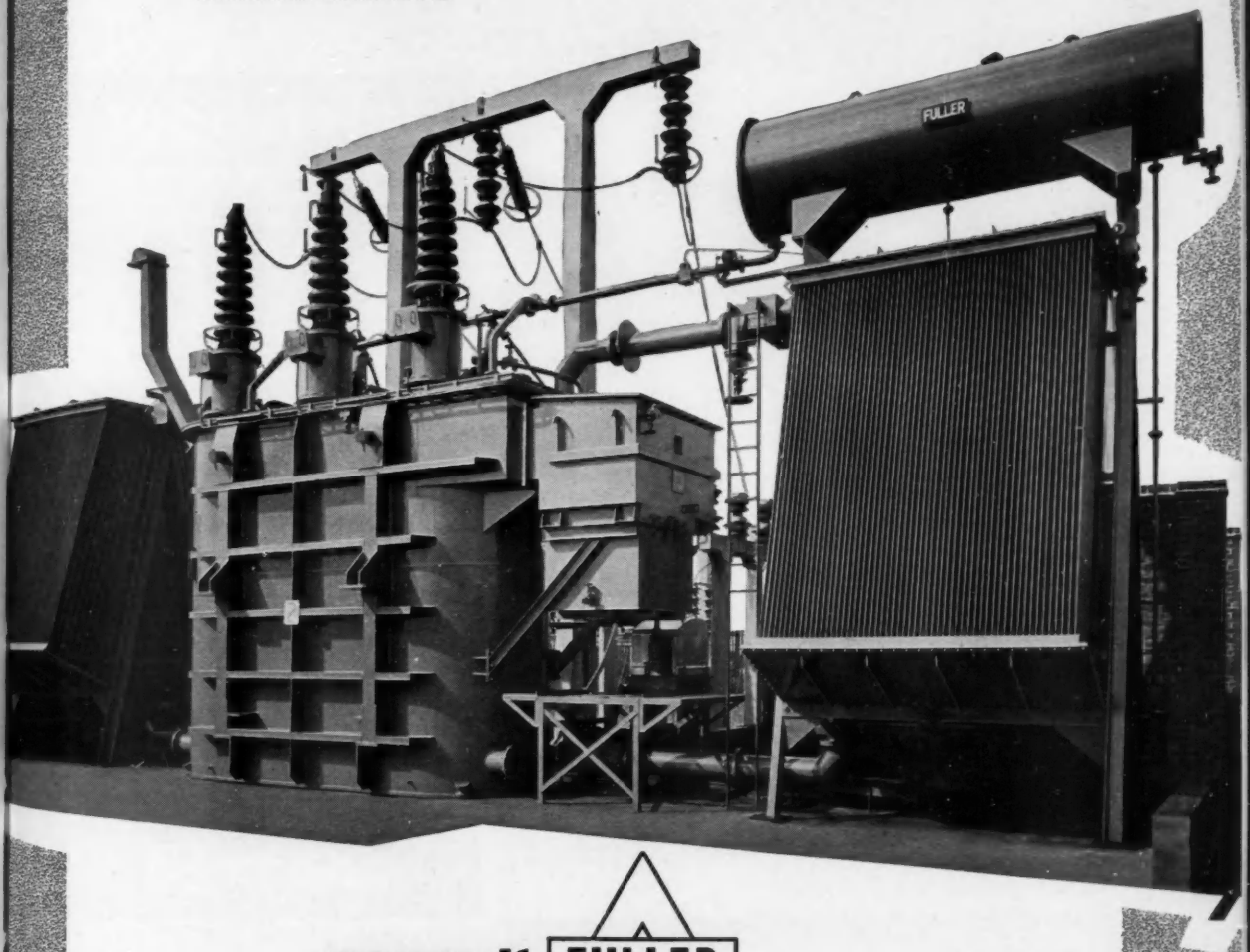
BELLING "Belling"

BELLING AND CO. LTD · ENFIELD · MIDDLESEX

CRC 268

TRANSFORMERS up to the largest sizes

We have been building transformers since 1919. You will find our products in service throughout the world. We can build them up to the largest sizes, the highest voltages, and thanks to our long association with ASEA of Sweden, we have access to an unrivalled experience of 380 kV practice. With factory facilities which are as well planned and as well equipped as any in the world, and with our rigorously maintained, meticulous standards, we can justly claim to be among the leaders in transformer manufacture.



consult FULLER ELECTRIC

DIAMOND 1898-1958 JUBILEE

FULLER ELECTRIC LTD · FULBOURNE RD · LONDON E.17

Telephone: LARkswood 2350

Also at Birmingham, Glasgow and Manchester

A member of the Hawker Siddeley Group

NICHROME

Specialists in nickel-containing alloys

NICHROME

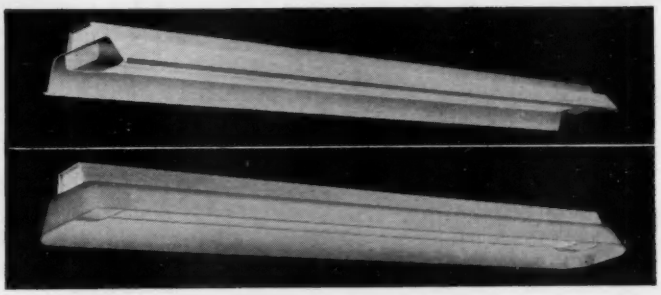
BRITISH DRIVER-HARRIS CO LTD
CHEADLE HEATH, CHESHIRE

Introducing the
atlas popular range
—good quality low priced fluorescent fittings

single or twin tubes tapped for all voltages prepacked—
complete with Atlas White tube(s)

industrial

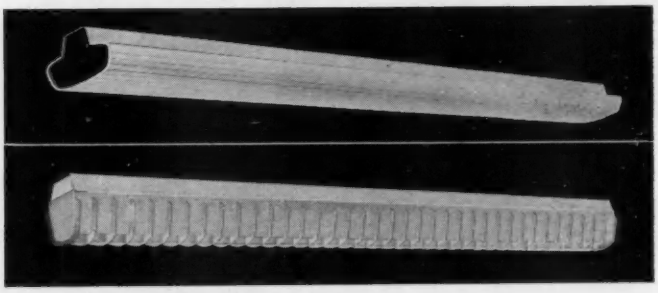
ATLAS KB SERIES
Popular 5 ft. 80 w. Industrial Reflector Fitting
complete with chassis, open ended metal reflector, control gear and Atlas White Bi-pin tube. Metalwork stove enamelled white.
£7 • 12 • 0 Twin Tube version £11 . 18 . 0



ATLAS KT SERIES
Popular 5 ft. 80 w. Trough Fitting
complete with chassis, one piece translucent opal 'Perspex' trough, gear and Atlas White Bi-pin tube.
£10 • 1 • 8 Twin Tube version £15 . 3 . 4

commercial

ATLAS KA SERIES
Popular 5 ft. 80 w. Enclosed Diffuser Fitting
complete with chassis, reeded opal Perspex diffuser, end plates, gear and Atlas White Bi-pin tube.
£11 • 18 • 1 Twin Tube version £16 . 9 . 4

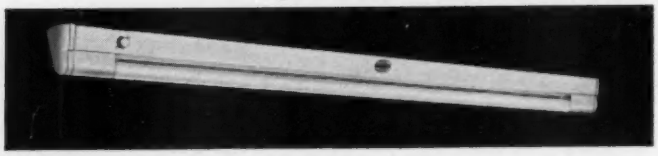


ATLAS KO SERIES Popular 5 ft. 80 w. Fitting
with 'Twinluve' pearl polystyrene diffuser, gear and Atlas White tube. Complies with Ministry of Education requirements for school lighting.
£13 • 5 • 5 Twin Tube version £17 . 3 . 10
4 ft. single £10 . 15 . 4 and 4 ft. twin £13 . 15 . 7

battens

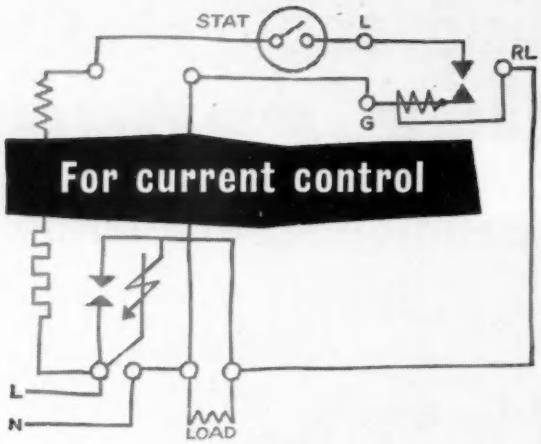
To the original series of 5ft., 4ft. and 2ft. Popular packs is now added a 5ft. twin tube fitting. All fittings are supplied stove enamelled white, with clip-on plastic end caps, complete with glow-switch, universal gear and Atlas White Tube.
5 ft. Popular Pack **£5•5•0** 4 ft. Pack £4 . 11 . 0
2 ft. Pack £3.10.0 5 ft. Twin Tube version £9.13.0

the original **Popular** *packs*
plus a twin tube version



atlas

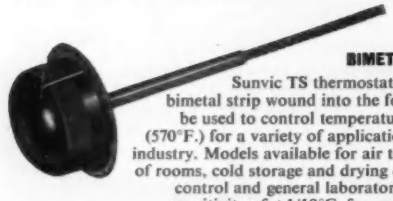
Atlas Lighting Limited
A subsidiary company of Thorn Electrical Industries Limited
233 Shaftesbury Avenue, London, W.C.2



...SPECIFY SUNVIC

Sunvic components are widely used for controlling equipment such as moulding presses, furnaces, incubators, chemical plant, etc. Together with the Sunvic potentiometric recorder they also have numerous applications in scientific and industrial research particularly for measuring, controlling and recording temperature and small electrical quantities.

If you have a specific problem or would like technical information on any or all Sunvic components, please contact Sunvic Controls Ltd., P.O. Box 1, Harlow, Essex. Tel: Harlow 25271.

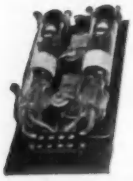


ADJUSTABLE BIMETAL THERMOSTATS

Sunvic TS thermostats are operated by a bimetal strip wound into the form of a helix. Can be used to control temperatures of up to 300°C. (570°F.) for a variety of applications in research and industry. Models available for air temperature control of rooms, cold storage and drying chambers, for oven control and general laboratory work, and with a sensitivity of ±1/10°C. for very accurate control.

ENERGY REGULATORS

The Sunvic energy regulator effects its control by periodically switching on and off the power, the ratio of the on-time to the total time determining the average power input, which is continuously variable. Available in several forms with a continuous rating of 1kW at 230V. A.C.; also supplied with an HVS relay for larger loads.



HOTWIRE VACUUM SWITCH (HVS) TUBES AND RELAYS

Available either as a loose tube for switching up to 10 kW at 400V. A.C. or D.C. or as a complete relay either enclosed in a plastic box or mounted on a paxolin base for incorporation in customer's own equipment. For single—or three-phase A.C. applications. Advantages are: no arcing; silent operation; low, non-inductive operating current; A.C. or D.C.; inductive or non-inductive loads.

SUNVIC

An A.E.I. Company

Control and research equipment for science and industry

relays, thermostats, time delays, energy regulators, D.C. amplifiers and potentiometric recorders

SC/68

Consult Birch

REGISTERED TRADE MARK

for STUD TYPE RESISTORS

Stud type Regulating Resistors of front-of-board or back-of-board patterns. All resistors are fully tested for correct grading, insulation resistance and minimum high pressure test of 2,000 volts r.m.s. A.C. for one minute.

Write for list No. 120

Asbestos Woven Resistor Nets	Heating Elements
Battery Charging Resistors	Loading Resistors
Cartridge Heaters	Motor Operated Resistors
Cubicle Heaters	Resistor Units
Dimming Resistors	Stud Type Resistors
Porcelain and Mica Wound Resistors	Sliding Resistors
	Strip Heaters Metal Cased
	Toroidal Resistors

VITREOUS ENAMELLED RESISTORS

Ferrule or wire end type. 1¼ — 250 watts. Full range of 24 sizes — List V.E. 190.

Birch

REGISTERED TRADE MARK

H. A. BIRCH & CO. LTD.

WOOD STREET, WILLENHALL, STAFFORDSHIRE

Telephone WILLENHALL 494 · 495 · Grams WILOHM WILLENHALL

LONDON OFFICE: 1-5 NORTHOLT ROAD, HARROW, MIDDLESEX

BYRON 5120

APPETITE flagging? Nervous indigestion? Don't reach for the bismuth—reach for the phone instead. You won't be the first cable-buyer who has sought easy, sure relief by calling in the Henley Eager Beavers. In 28 branches, strategically placed all over the country, hundreds of Eager Beavers are waiting . . . palpitating . . . to show *you* what Service means. They've cured more incipient ulcers than all the patent medicine pedlars in Petticoat Lane!

HENLEY

Eager Beaver Service

brings you the wiring cables you want

...WHERE YOU WANT THEM ...WHEN YOU WANT THEM

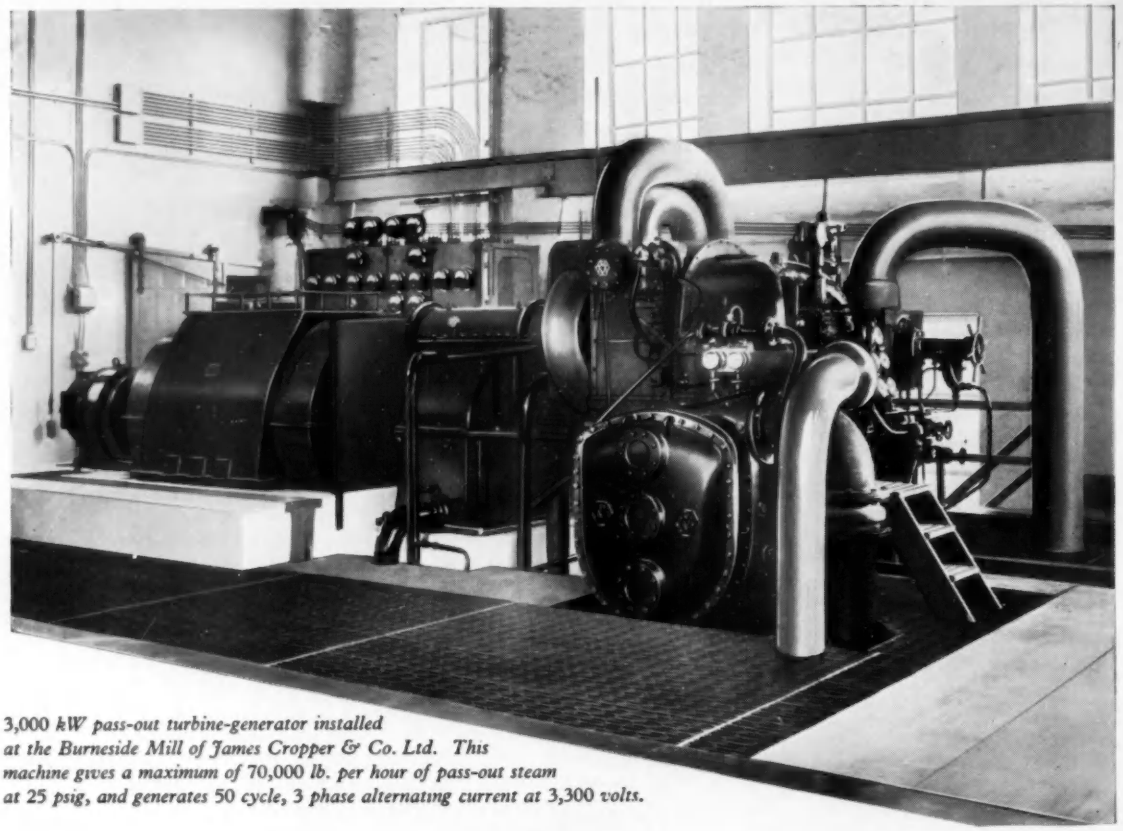
HENLEY WIRING CABLES FROM STOCK

V.R. Braided and Compounded
P.V.C. Insulated only
P.V.C. Insulated and Sheathed
Polythene Insulated and P.V.C. Sheathed
V.R. Insulated Tough Rubber Sheathed
V.R. Insulated Lead Alloy Sheathed
Flexible Cords—Rubber and Plastic

These are but a few of the very wide range of cables and wires we manufacture to cover every electrical need

W. T. HENLEY'S TELEGRAPH WORKS CO LTD · 51-53 HATTON GARDEN · LONDON · E.C.1 · TEL: CHANCERY 6822

A*



3,000 kW pass-out turbine-generator installed at the Burneside Mill of James Cropper & Co. Ltd. This machine gives a maximum of 70,000 lb. per hour of pass-out steam at 25 psig, and generates 50 cycle, 3 phase alternating current at 3,300 volts.

Steam is costly

-make it work

In many industries where steam is used for processes or heating it is economical to install A.E.I. pass-out turbine-generators and so generate electrical power and cut fuel costs.

A.E.I. has had great experience in the design of self-contained pass-out and condensing steam turbines, and will be pleased to advise on their application in your particular industry.

A·E·I TURBINE-GENERATOR DIVISION

MANCHESTER AND RUGBY

A DIVISION OF ASSOCIATED ELECTRICAL INDUSTRIES LTD., incorporating the interests of M-V & BTH WORKS AT MANCHESTER AND RUGBY, ENGLAND · GERMISTON, SCOTLAND · LARNE, NORTHERN IRELAND

E/B 704

CHOOSE A FLEXELLO CASTOR

Flexello

CONSTANT QUALITY

CASTORS

Choose your castors from the largest range in Europe. Flexello will meet your special requirements individually, while our fabricating division designs and manufactures "special" castors for extra heavy and difficult applications.

illustrated are a small part of our vast range.

Write for illustrated leaflet to Dept. ER.

FLEXELLO CASTORS & WHEELS LTD., SLOUGH, BUCKS. Tel: SLOUGH 24121

"There's none better. I say THERE'S NONE BETTER. When you fix a Wootton Meter Board it's fixed for keeps. Unaffected by climatic changes — no contraction or expansion. Wootton means that extra something that makes all the difference."

and wood blocks • sunk switch boxes • instrument cases

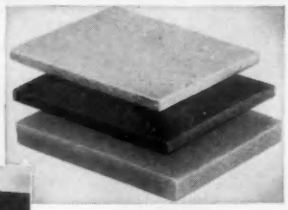
WOOTTON & CO. LTD. · ALMA WORKS · PONDERS END · MIDDLESEX · *Telephone: Howard 1858*

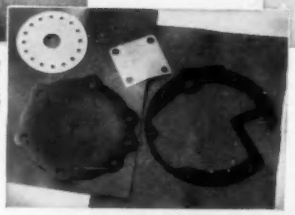
PRESCOLASTIK REGD.

SILICONE RUBBERS

The most comprehensive range available

B. Prescolastik Silicone Rubber Sheet
Uses: Gaskets, Seals, Diaphragms, Washers, Etc.





A. Prescolastik Expanded Silicone Rubber
Uses: Soft Gasketing, Vibration Damping, Seals, Pads and Dampers.

C. Prescolastik Silicone Coated Fabrics
Uses: Diaphragms, Gaskets, Seals, Tapes, Ductings and Flexible Low Temperature Coverings.

TAKE ADVANTAGE of the technical resources and production facilities of the most modern silicone rubber plant in the United Kingdom.

Prescolastik silicone rubbers offer the widest available range of compounds to meet the most exacting conditions.

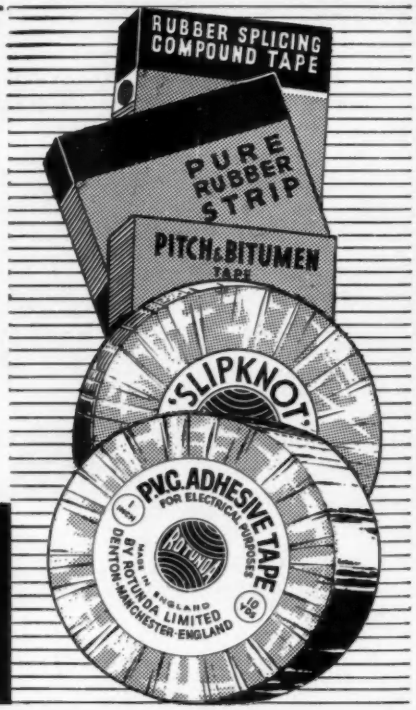
General Purpose Grades
Low Temperature Grades
Low Compression Set
Fuel and Oil Resistant Grades
Silicone Coated Fabrics
High Tensile Grades
High Temperature Grades
H.T.P. Resistant Grades
Cellular Rubbers

Designers and Engineers are invited to write to us for technical data.

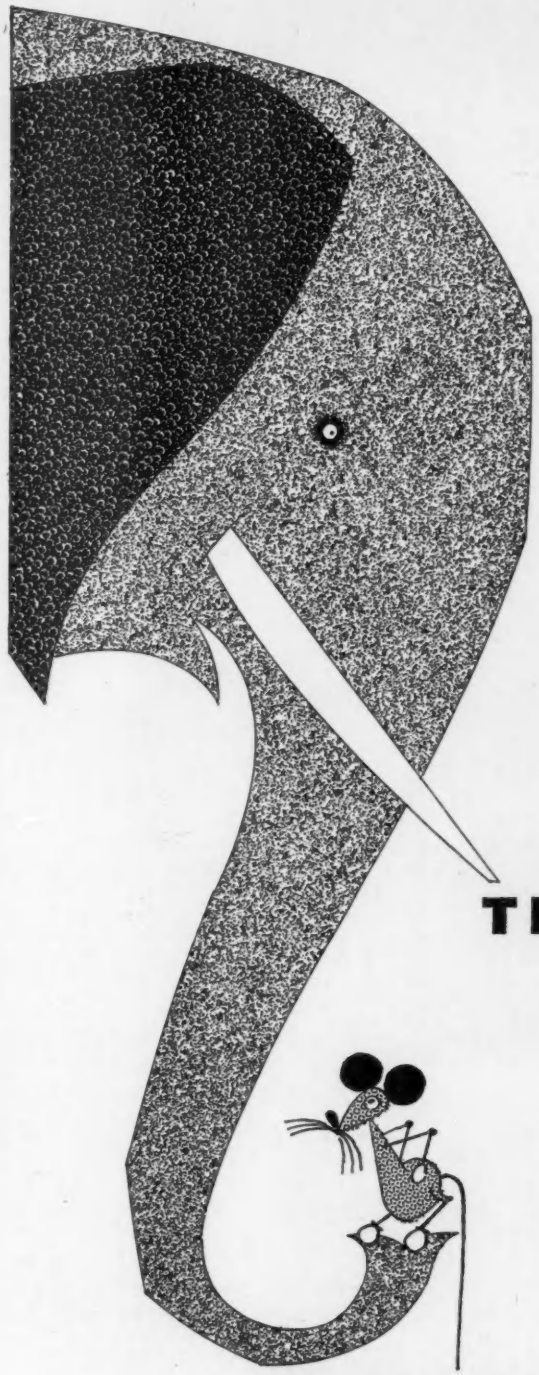
Specialists in precision rubber engineering

PRECISION RUBBERS LIMITED

BAGWORTH, LEICESTER, ENGLAND
Telephone: Bagworth 241



ROTUNDA LIMITED • DENTON • MANCHESTER



LARGE or small

HV. or **LV.**

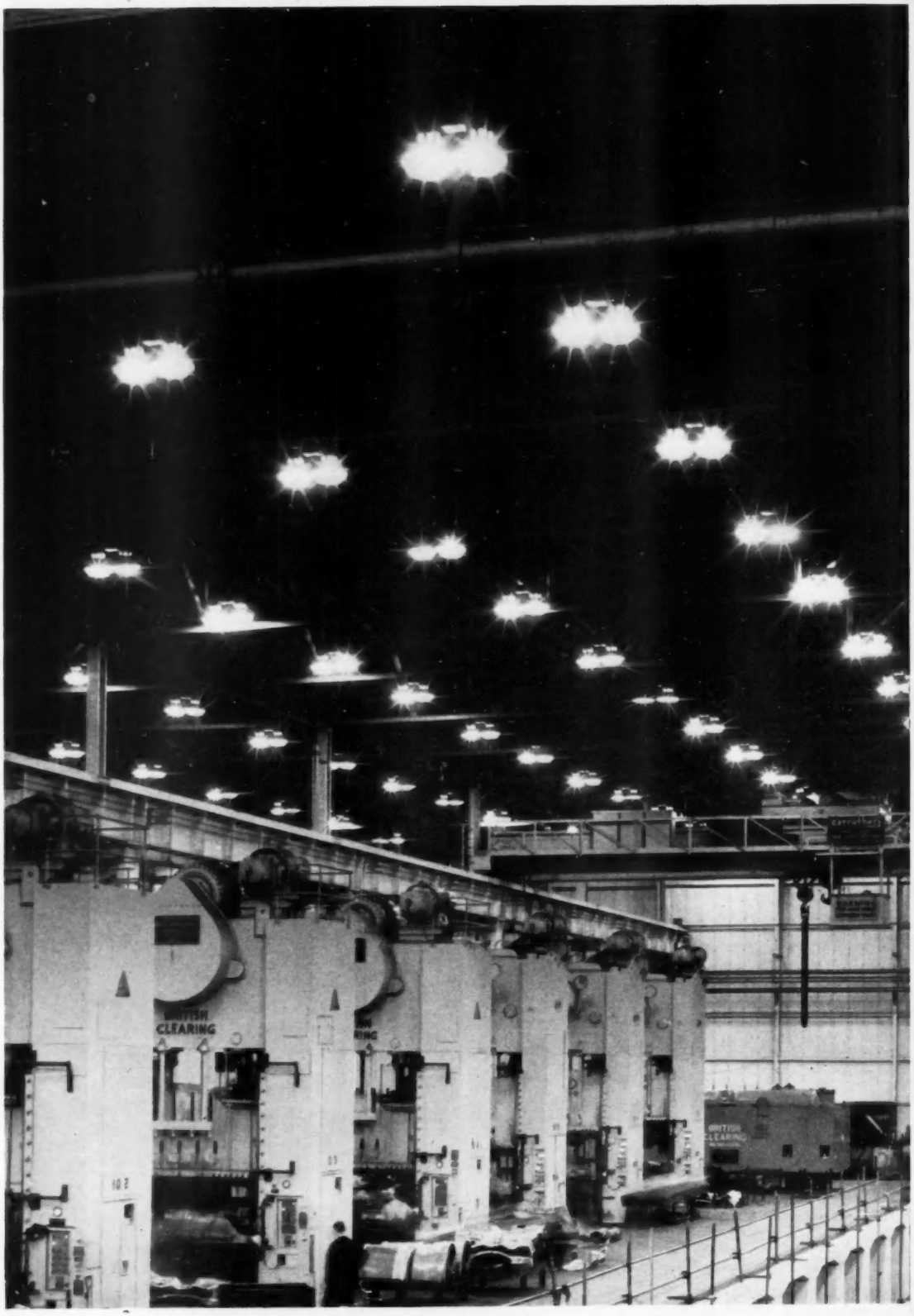
it's agreed

DAVENSET

TRANSFORMERS

Of course!

PARTRIDGE WILSON & CO. LIMITED LEICESTER


BRITISH
CLEARING

Photograph by courtesy of Ford Motor Company Ltd

LIGHTS WE LIVE BY

Well-lit factories are essential for increased production. Lighting these factories is an achievement of which Revo are proud.
Today, factories, streets, stadiums, schools and public buildings all over the world are lit by Revo. Specialists in solving electrical problems, Revo's fifty years of experience extends over the whole of the electrical field — from industrial lighting to factory switchgear, from electronic equipment to domestic appliances.

Lights we live by . . .

by REVO

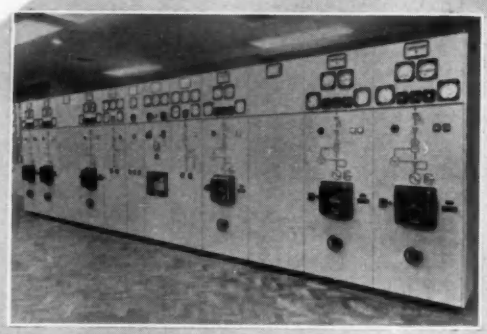
By installing these "Duo-Lite" Industrial Reflector Fittings, Revo engineers solved many of the lighting problems of the Ford Motor Company Ltd.

REVO ELECTRIC CO. LIMITED, TIPTON, STAFFS
A Duport Company
Member of the British Lighting Council

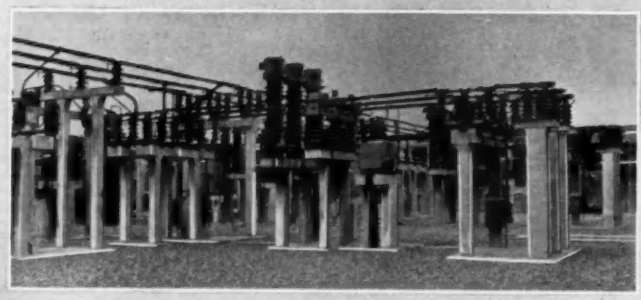
ROLLS-ROYCE LTD. DERBY. AERO ENGINE ALTITUDE TEST PLANT

WITH SWITCHGEAR SUPPLIED BY REYROLLE

The 33-kV 1000-MVA small-oil-volume switchgear and ancillary equipment controlling the supply to the six 22,000-H.P. compressor-motors was manufactured and installed by Reyrolle



Photographs by courtesy of Rolls Royce Ltd.
Consulting Engineers: McLellan and Partners in association with Messrs. Merz and McLellan

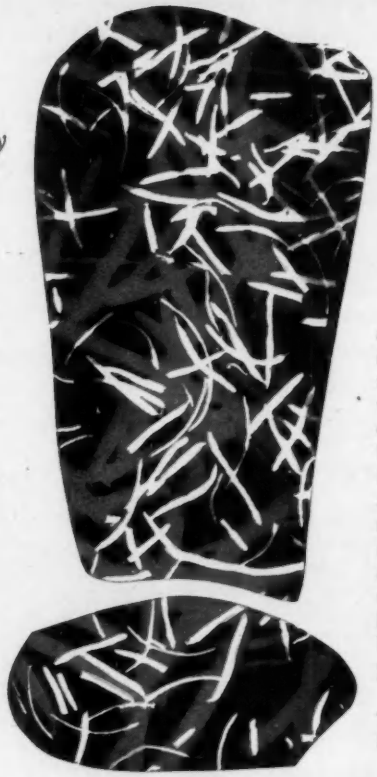


Reyrolle

A. REYROLLE & CO. LTD. HEBBURN COUNTY DURHAM ENGLAND

Only very occasionally does a new material appear that has a widespread potential throughout industry.

Here, though, is just such a product — a unique material that deserves your fullest understanding.

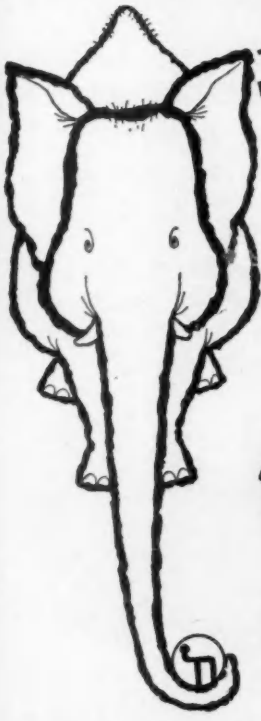


Refrasil

a lightweight fibrous silica material of very fine diameter, is being increasingly applied as a flexible high temperature electrical insulator. It is capable of withstanding continuously temperatures in the order of 1,000°C, or for short periods, even above. As well as being an excellent high temperature electrical insulator, Refrasil has outstanding thermal insulation characteristics at elevated temperatures. Like fused silica it has a high resistance to thermal shock and to chemical attack from acids. It is available as batt, felted wool, cloth, tape, sleeving, bulk fibre, cord, and yarn. There are many other things well worth your knowing about Refrasil; we have incorporated them all in a brochure which we would like to send you.

REFRASIL

THE BRITISH REFRASIL COMPANY LIMITED
Stillington, Co. Durham Tel: Stillington 351



THE BEST IN ANY SHAPE OR FORM

This high standard of presswork is upheld by judgement and experience gained over forty years in the production of fine quality pressings. Our claim as master craftsmen assures your complete satisfaction, both with service and workmanship. Every order is handled with extreme care and given prompt attention. We welcome your enquiry.

THE HAMPTON WORKS (STAMPINGS) LIMITED
PRESSWORK EXPERTS

TWYNING ROAD • STIRCHLEY • BIRMINGHAM
Telephone: KINgs Norton 2901 Telegrams: RADIAGILLS, BIRMINGHAM

ISMAY
ART
CANDLE LAMP

In 25W. and 40W. White Opal or colour sprayed champagne, red or green. Standard Caps. B.C. and S.B.C.

All enquiries to:
ISMAY LAMPS LIMITED
Roden Street Works, Ilford, Essex
Telephone: ILFORD 1153

METWAY

"SUPERWAY" BOWL FIRE 18/6 plus 3/3 P.T. | "DANDYWAY" BOILING RING 19/8 No P.T. | "MIDGETWAY" ELECTRIC KETTLE 30/3 plus 6/6 P.T. | "FROSTAWAY" HEATER 11/11 plus 2/7 P.T.

ASK FOR OUR NEW APPLIANCES CAT. NO. DAR/10ER

METWAY WORKS · KEMPTOWN · BRIGHTON

THE MERITUS

HIGH CURRENT NEUTRAL LOOP IMPEDANCE AND CONTINUITY TESTER

SHOCKPROOF AND SAFE FOR OPERATOR AND INSTRUMENT

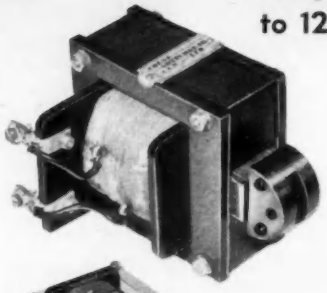
This instrument will SAFELY carry out tests on electrical installations and appliances as recommended in the I.E.E. Regulations, 13th Edition, 1955, Section 5.

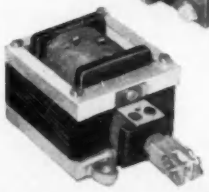
MERITUS (BARNET) LTD.

BARNET, HERTS. Bar. 2291/2

"Colne" SOLENOIDS

Range from 4 to 120 pounds pull





We invite your enquiries

Manufactured by

Colne

SWITCHGEAR (K & W) LTD.

formerly Electrical Products (Colne) Ltd.

Walton Street, Colne, Lancs.

Phone: Colne 1394/5

small wonder . . .

The very wide range includes :

★ UNIVERSAL 1/250 to ¼ h.p.

★ SINGLE, SPLIT PHASE 1/100 to ½ h.p. and CAPACITOR 1/80 to 1/6 h.p.

★ 3-PHASE 1/20 to 1/3 h.p.

★ SYNCHRONOUS 1/100 to 1/16 h.p.

★ SHADED POLE 1/160 h.p. at 1,300 r.p.m.

★ GEARED UNITS 0.125 to 600 r.p.m. Torque up to 850 lbs/ins.

Our vast resources and many years of wide and practical experience are available to you. Consult us first — and be sure of success !

● Illus.: Type 334C40 Geared Motor, with A.C. and D.C. interchangeable frames 1-20 r.p.m. Torque : 20-10 lb/ins.

FRACMO does a big job!

FRACTIONAL H.P. MOTORS LTD

Rookery Way · Hendon · NW9 · Phone: COLindale 8022/4

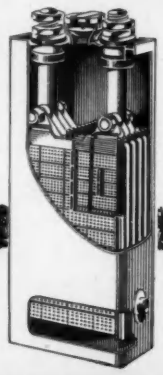
Also 6 Lansdowne Road, Erdington, Birmingham 24
Phone : Erdington 0460

DaF 29858 ER

WHAT'S NEW ABOUT NIFE SWITCH TRIPPING UNITS?

The design is, for a start. The fascia panel, with its flush-fitting rectangular meters, is particularly clean and uncluttered. The inclusion of a high-rate charge indicating light is without precedent. Inspection of batteries has been simplified by putting them in *one* tier. The useful space at the bottom of the cabinet is just the place for tools. Finally, the cost is new. No, it isn't more but *less* than that of the former model. Now—

What's old about Nife Switch Tripping Units? Their reliability! Like the previous 12,500 models which are in service throughout the world, these new units are steelclad, self-contained and powered by the Nife steel battery. The battery that's free from self-discharge; the battery that won't corrode. The battery, in short, that *never* lets you down.



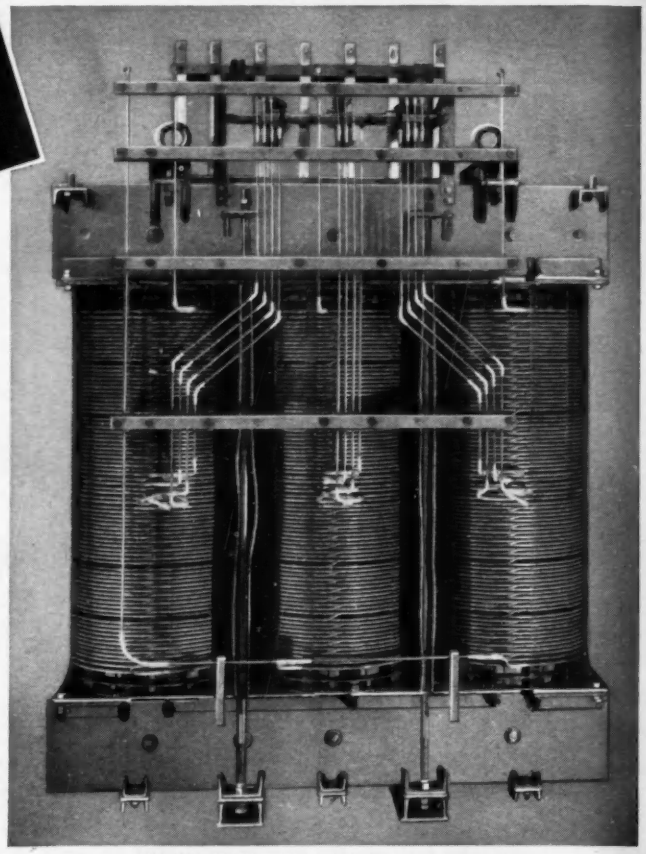
The Nife Switch Tripping Unit can be used, in addition, for any other application involving intermittent discharges. You'd like to know more about it?

Write for Publication No. 2751/A

NIFE BATTERIES · REDDITCH · WORCESTERSHIRE

NI27

MINERVA
INSULATING VARNISHES ENAMELS AND COMPOUNDS



2000 kVA 33 kV/3,3 kV TRANSFORMER INTERIOR
By kind permission of The Electric Construction Company Ltd., *Wolverhampton.*

STOVING VARNISHES (Natural Resin Type)
STOVING VARNISHES (Synthetic Resin Type)
THERMO-SETTING VARNISHES
SOLVENTLESS VARNISHES
AIR-DRYING VARNISHES
CLOTH VARNISHES
CORE-PLATE VARNISHES
(Stoving and Air-Drying)
COPPER WIRE ENAMELS
(Oleo-resinous and Synthetic Types)
All the above are supplied in black and clear
ACID & HEAT RESISTING ENAMELS
Available in all colours.
MICA BONDING VARNISHES
COIL STICKING VARNISHES
SLEEVING VARNISHES
(Black, Clear and Colours)
CABLE LACQUERS
(Non-flam., Cellulose Type and P.V.C.)
COMPOUNDS (Various Types)

We are constantly developing Special Varnishes to meet the many and varied requirements of the Electrical Industry. The tendency has been to concentrate on the development of Varnishes utilising Synthetic Resins. The advent of these Synthetic Types of Insulating Varnishes which have been developed by constant research over many years in our Chemical, Electrical and Physical Laboratories has enabled us to produce Insulating Varnishes to meet the most exacting requirements set by the Electrical Industry, thereby maintaining the high reputation and standard of 'MINERVA' Insulating Products.

Catalogue post free

All the materials listed conform to B.S. Specifications wherever applicable

Pinchin, Johnson & Co.

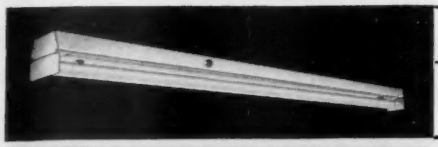
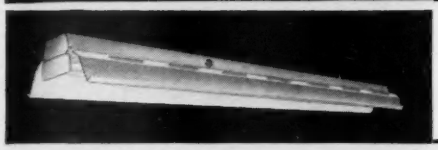
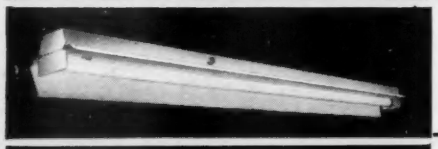
4 CARLTON GARDENS, LONDON, S.W.1

Telephone: TRAfalgar 5600

Branches: BELFAST, BIRMINGHAM, BOOTLE, BRIGHTON, BRISTOL, GLASGOW, LEEDS, MANCHESTER, NEWCASTLE-ON-TYNE & SOUTHAMPTON

EKCO answers your cost problems with the Economy Range

Fluorescent Fittings *Complete with Tubes*

	Fittings	5 ft. Cat. Nos.	List Price incl. tube(s) & P.T.	4 ft. Cat. Nos.	List Price incl. tube(s) & P.T.
	Battens				
	Single	F51081	£ 6.10.0	F41081	£5.11.0
	Twin	F52081	£10.16.0	F42081	£8.15.0
	Reflectors				
	Single	F51082	£ 7.12.0	F41082	£6.12.0
		F51083	£ 7.12.0	F41083	£6.12.0
	Twin	F52082	£11.18.0	F42082	£9.16.0
		F52083	£11.18.0	F42083	£9.16.0
	Angle Reflectors				
	Single	F51088	£ 7.12.0	F41088	£6.12.0
	Twin	F52088	£11.18.0	F42088	£9.16.0
	Diffusers				
	Single	F51381	£13.14.1 incl. £1.16.9 P.T.	F41381	£12. 5.5 incl. £1.14.10 P.T.
	Twin	F52381	£18.13.7 incl. £2.4.11 P.T.	F42381	£16. 0.8 incl. £2.0.6 P.T.

Available in both single and twin tube, 4 ft. and 5 ft. sizes with Switchstart control gear.
Complete with either White or Warm White Tubes.

AND ALSO THE '035' BATTENS

	Cat. No.	Size	List Price incl. tube(s) & P.T.	Cat. No.	Size	List Price incl. tube(s) & P.T.
	F51035	5 ft.	£5. 5.0	F41035	4 ft.	£4.11.0
	F52035*	5 ft.	£9.13.0	F21035	2 ft.	£3.10.0

* This is the new twin tube fitting. All others in '035' Battens are single tube.

The list prices include fluorescent tube(s), purchase tax on tube(s) and on diffuser fittings where applicable.

EKCO-ENSIGN ELECTRIC LTD., 45 ESSEX STREET, STRAND, LONDON, W.C.2. Telephone: CITY 8951

Sales Offices, Illuminating Engineering Departments, Showrooms and Depots in

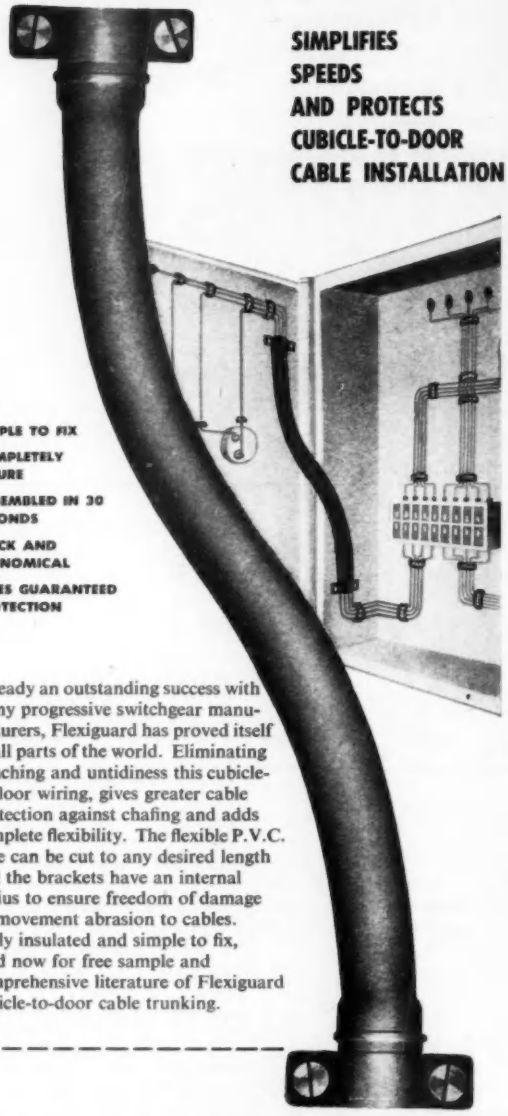
LONDON · MANCHESTER · BIRMINGHAM · NOTTINGHAM · GLASGOW · CARDIFF

EL. 61

Insuloid

FLEXIGUARD

flexible cable trunking



SIMPLIFIES
SPEEDS
AND PROTECTS
CUBICLE-TO-DOOR
CABLE INSTALLATION

SIMPLE TO FIX

COMPLETELY SECURE

ASSEMBLED IN 30 SECONDS

QUICK AND ECONOMICAL

GIVES GUARANTEED PROTECTION

Already an outstanding success with many progressive switchgear manufacturers, Flexiguard has proved itself in all parts of the world. Eliminating bunching and untidiness this cubicle-to-door wiring, gives greater cable protection against chafing and adds complete flexibility. The flexible P.V.C. tube can be cut to any desired length and the brackets have an internal radius to ensure freedom of damage by movement abrasion to cables. Fully insulated and simple to fix, send now for free sample and comprehensive literature of Flexiguard cubicle-to-door cable trunking.

Find out about these other Insuloid products

AS ADJUSTABLE SADDLES, SAS SINGLE SCREW ADJUSTABLE SADDLE

CRADLECLIP, PLASKLIP, BUS BAR INSULATION, TYPE NX, X & CY CLIPS

INSULOID MANUFACTURING CO. LTD.

Sharston Works, Leestone Road, Wythenshawe, Manchester

Tel: WYT 2842 & 3163 *Grams: INSULOID MANCHESTER*

Fire alarms

manual or automatic contacts, for large or small premises- we contract for installations or supply equipment.

Write for catalogue to

ASSOCIATED FIRE ALARMS LTD.

Claremont Road, London, E.17
LARkswood 8373/4
Branches throughout Great Britain

THE LONGEST EXPERIENCE — AFA — PLUS THE MOST UP-TO-DATE EQUIPMENT

TAS/AF.93

These numbers

save time note them now!

Examine carefully a TEMCO 13 amp socket outlet or switched socket outlet. One of the first features to impress you will be the way in which the terminals and terminal screws are positioned so that wiring can be carried out more easily, more quickly. That is not accidental but is characteristic of the care taken to ensure the highest possible efficiency for all TEMCO Accessories.

Other points you will observe in this range will be:

The extra large terminals.

The smooth working of the simple, yet robust shutter mechanism.

The snap acting switch with its solid silver contacts.

The extra deep recess at the back of the surface sockets.

These accessories are also available in cream. Please write for catalogue.

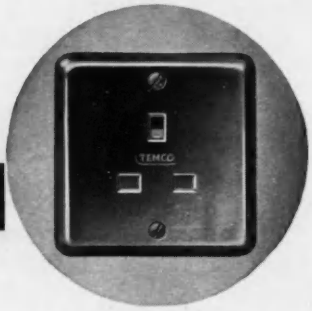
TEMCO

WIRING ACCESSORIES

T.M.C. – HARWELL (SALES) LTD.
37 Upper Berkeley Street, London, W.1.
A subsidiary of Telephone Manufacturing Co. Ltd.
Tel: PADdington 1867/8/9

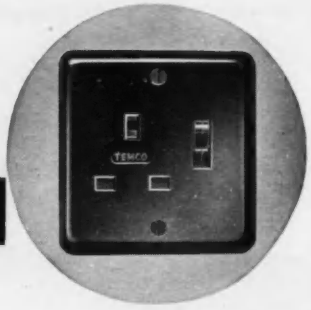
Cat. No. **1310** BROWN

Cat. No. **1315** BROWN

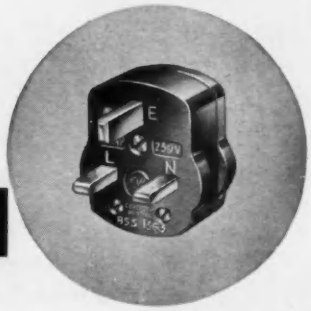


Cat. No. **1350** BROWN

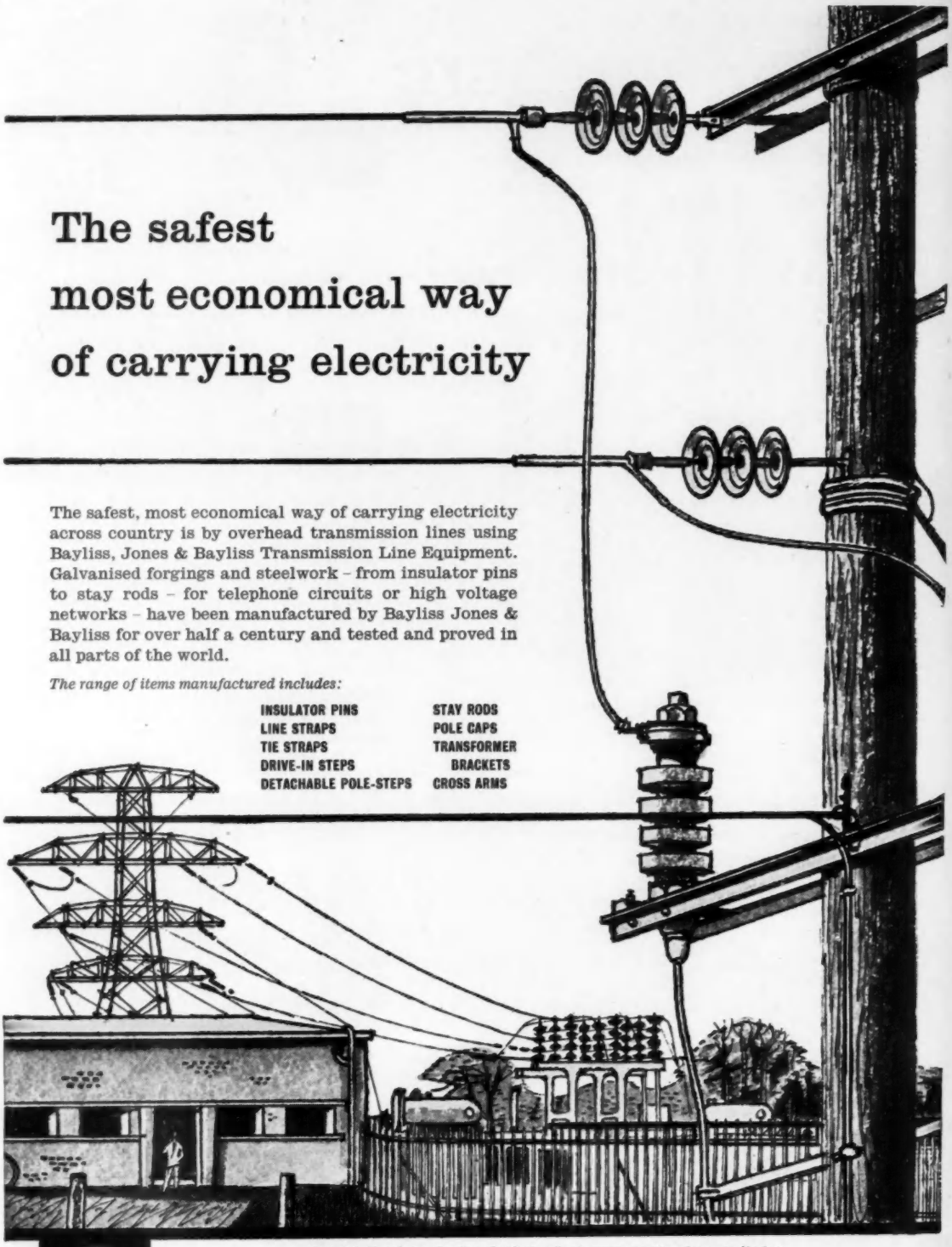
Cat. No. **1355** BROWN



Cat. No. **1380** BROWN



The safest most economical way of carrying electricity



The safest, most economical way of carrying electricity across country is by overhead transmission lines using Bayliss, Jones & Bayliss Transmission Line Equipment. Galvanised forgings and steelwork – from insulator pins to stay rods – for telephone circuits or high voltage networks – have been manufactured by Bayliss Jones & Bayliss for over half a century and tested and proved in all parts of the world.

The range of items manufactured includes:

INSULATOR PINS	STAY RODS
LINE STRAPS	POLE CAPS
TIE STRAPS	TRANSFORMER BRACKETS
DRIVE-IN STEPS	CROSS ARMS
DETACHABLE POLE-STEPS	

BJB

For details of standard and off-standard components, please write to:

BAYLISS, JONES & BAYLISS LIMITED

HEAD OFFICE: VICTORIA WORKS · WOLVERHAMPTON · TELEPHONE: WOLVERHAMPTON 20441
LONDON OFFICE: 139 CANNON STREET · E.C.4 · TELEPHONE: MANSION HOUSE 8524

. . . for all electrical installations

F. H. Wheeler & Co. Ltd.

London, Birmingham, Bournemouth, Bristol, Cardiff, Manchester, Newcastle, Sheffield, Southampton

Member of the K. G. (HOLDINGS) LTD. Group of Companies

Very nice too .... but what about water..?

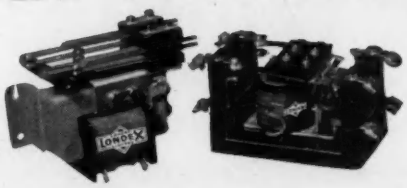
You can have an automatic water supply for very little outlay if you use a Beresford self-priming pump We make pumps for shallow wells or deep wells and bore-holes, for the cottage, the farm, the factory or the town. They are reliable, simple to install, inexpensive to run. If you want water, why not write for more details? Please ask for Publication P.F.381.

BERESFORD pumps

James Beresford & Son Ltd.
(The Cornercroft Group of Companies)
Ace Works, Kitts Green, Birmingham 33
Telephone: Stechford 3081
Branches and Agents throughout Britain and Overseas

BH.236.

LONDEX Relays



Type L.F. Silver Contacts. One Open. One Closed
Type L.F. Three Changeover Contacts.
Type MOL. Two Changeover Contacts.
All Coils 200-250 V A.C.

These MODELS AVAILABLE FROM STOCK

LONDEX LTD.

ANERLEY WORKS, LONDON, S.E.20. SYDenham 6258

Dainite

MOULDED RUBBERS SERVICE

Our technical staff will be pleased to call and discuss your special needs.

THE HARBORO' RUBBER CO. LTD. Dainite Mills, Market Harborough. Tel: 2274/6

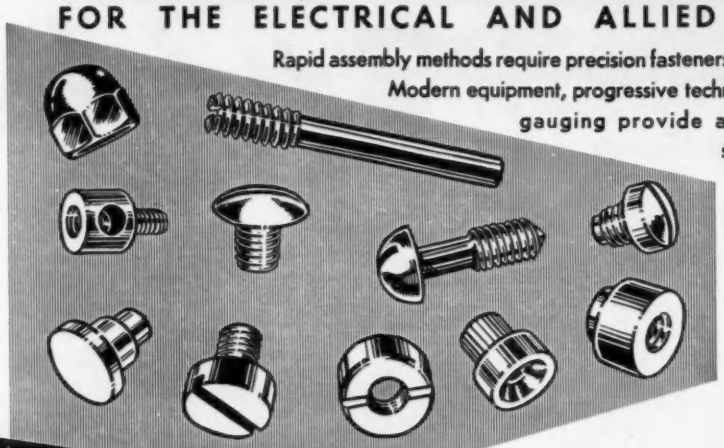
Precision

TURNED FASTENERS

FOR THE ELECTRICAL AND ALLIED TRADES

ALL AUTOMATIC AND CAPSTAN TURNED PRODUCTS

STOCKS of standard turned screws available for immediate use



Rapid assembly methods require precision fasteners and components. Modern equipment, progressive technique, and quality gauging provide an unsurpassed specialist service.

VERNIER

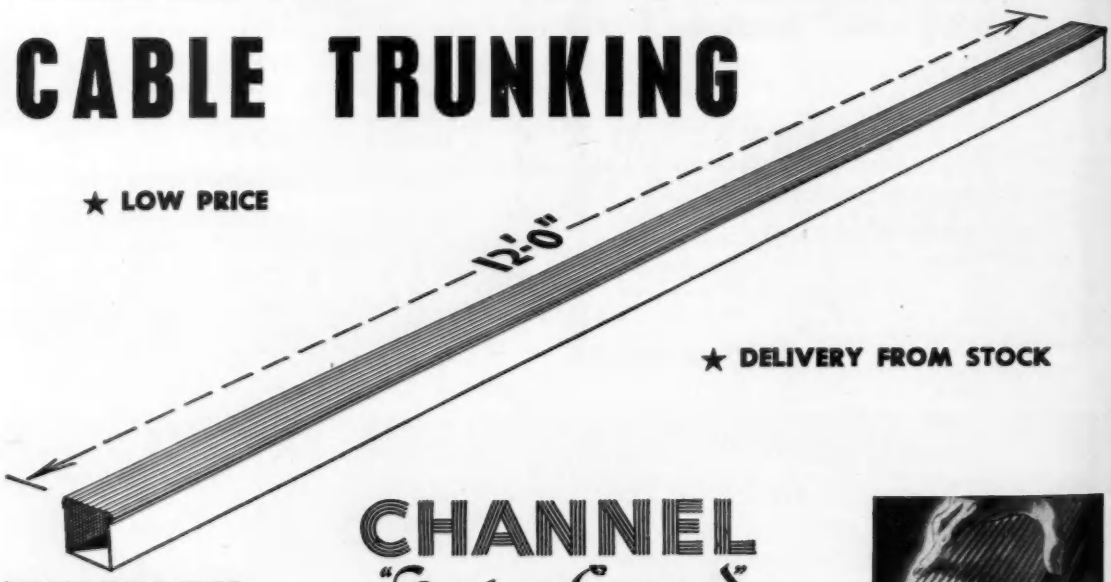
MANUFACTURING CO. LTD.

Garman Road, London, N.17

Telephone: Tottenham 5077

CABLE TRUNKING

★ LOW PRICE

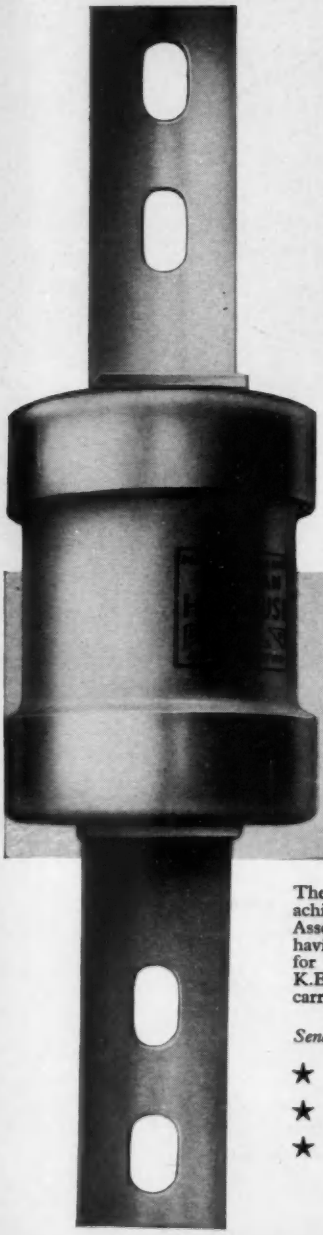


★ DELIVERY FROM STOCK

WRITE FOR BROCHURE No. R.A.142

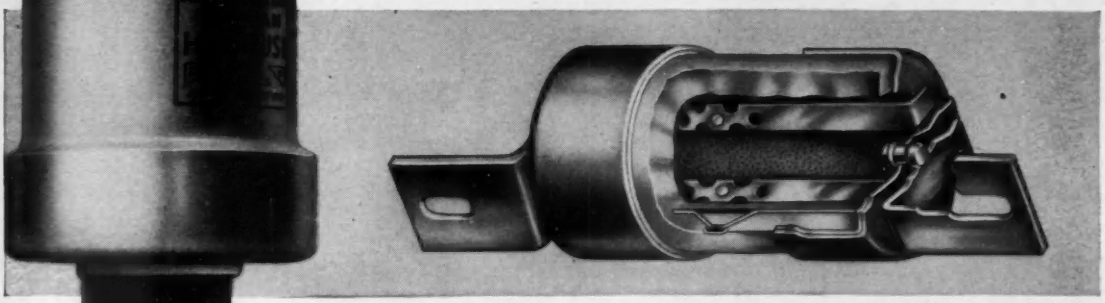
CHANNEL "Spring Capped" CONDUIT

CHANNEL CONDUITS LTD., No. 10 FACTORY, INDUSTRIAL ESTATE
BLETCHLEY, BUCKS Telephone: BLETCHLEY 2531



DORMAN

TYPE 'Q' H.R.C.
cartridge fuse links



The Dorman type 'Q' H.R.C. Cartridge Fuse Link has been designed and developed with a view to achieving a fusing efficiency hitherto unknown. It has been subjected to stringent tests by the Association of Short-Circuit Testing Authorities, in accordance with B.S. 88, 1952, Clause 8 and having passed such tests successfully has received A.S.T.A. Certificates for ratings up to 400 amp. for category of duty 440v. A.C.5. Ratings up to 100 amp. have been successfully tested by K.E.M.A. for category of duty D.C.4. In actual performance the fuse link remains cool when carrying its full load, and, due to the special construction of the element is consistent in operation.

Send for your copy of our latest brochure.

- ★ **For Category of Duty 440v. A.C.5.**
- ★ **A.S.T.A. Certified to B.S. 88 (1952).**
- ★ **Advanced Technical Design gives high efficiency under all conditions.**

DORMAN & SMITH LTD.

PRESTON Atherton Works, Blackpool Rd., Preston Lancashire *Tel: PREston 86785 (6 lines)*

LONDON 125 High Holborn, W.C.1 *Tel: CHAncery 6431*

BIRMINGHAM 2/3 Graham St., Birmingham 1 *Tel: CENtral 2009*

GLASGOW 249 St. Vincent Street, Glasgow C.2 *Tel: CENtral 2479*

To: Dorman & Smith Ltd., Atherton Works, Blackpool Road, Preston, Lancashire.

Please send latest Dorman type 'Q' H.R.C. Cartridge Fuse Link Catalogue.

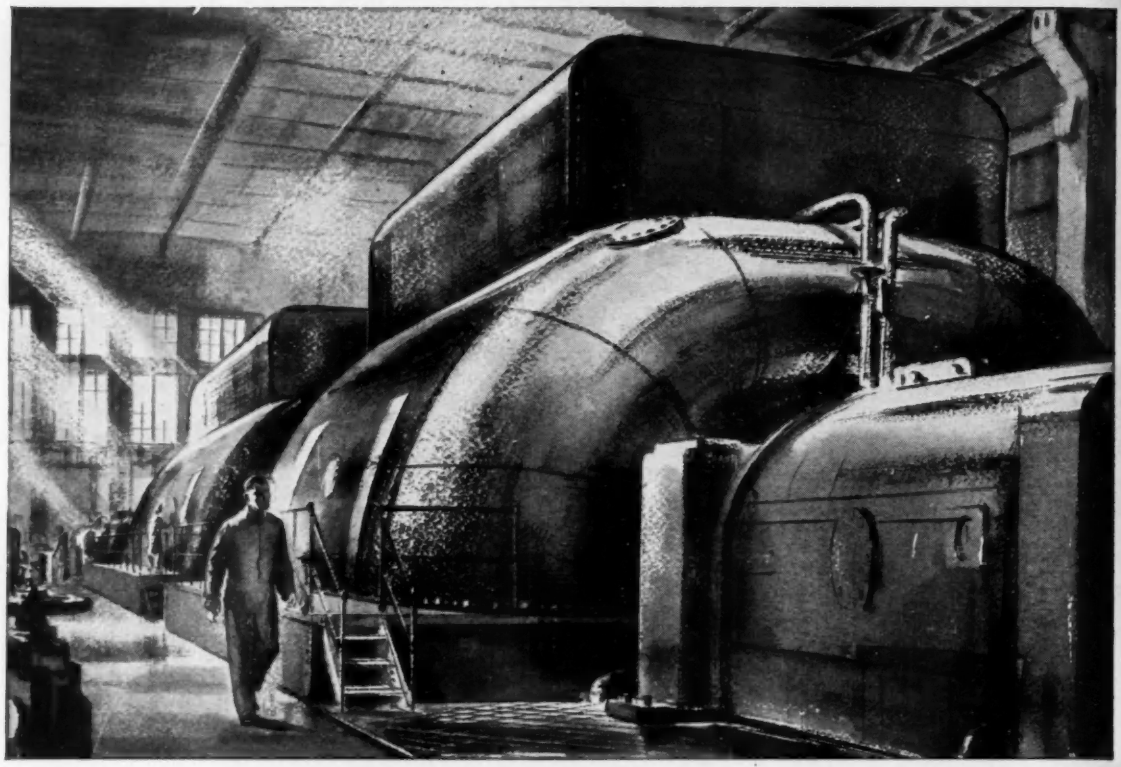
NAME.....

POSITION.....

FIRM .....

.....

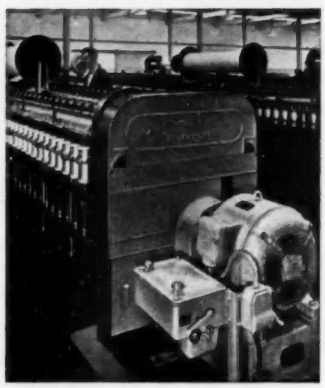
ER/11/58



The world's largest Generators will help to fill the demand for still more power

Progress in the development of nuclear energy for generating electricity is still making front-page news —and rightly so. Spectacular advances are continually being made. Less publicised, though in their own field no less outstanding, are recent developments in the design of "conventional" generating plant. The turbo-alternator illustrated, for instance, is a 550,000 kilowatt unit—twice the capacity of the next largest generator now on order for the Central Electricity Generating Board. This machine has been designed for the projected new power station at Thorpe Marsh. For Blythe 'B', another new station, 275,000 kilowatt in-line units are on order. These sets will be served by unit boilers and will operate at steam conditions of 2350 lb. per sq. in. and 1050°F, with reheat to 1000°F.

Nuclear power stations will play an increasingly important part in meeting the doubled demand for electricity forecast for the next ten years. Construction work is progressing rapidly at the sites of the Board's first three nuclear power stations, at Bradwell, Berkeley and Hinkley Point. The aggregate capacity of these stations will be not less than 1,100,000 kilowatts; and by 1966/7 some 5 to 6 million kilowatts of nuclear-generated electric power will be available.

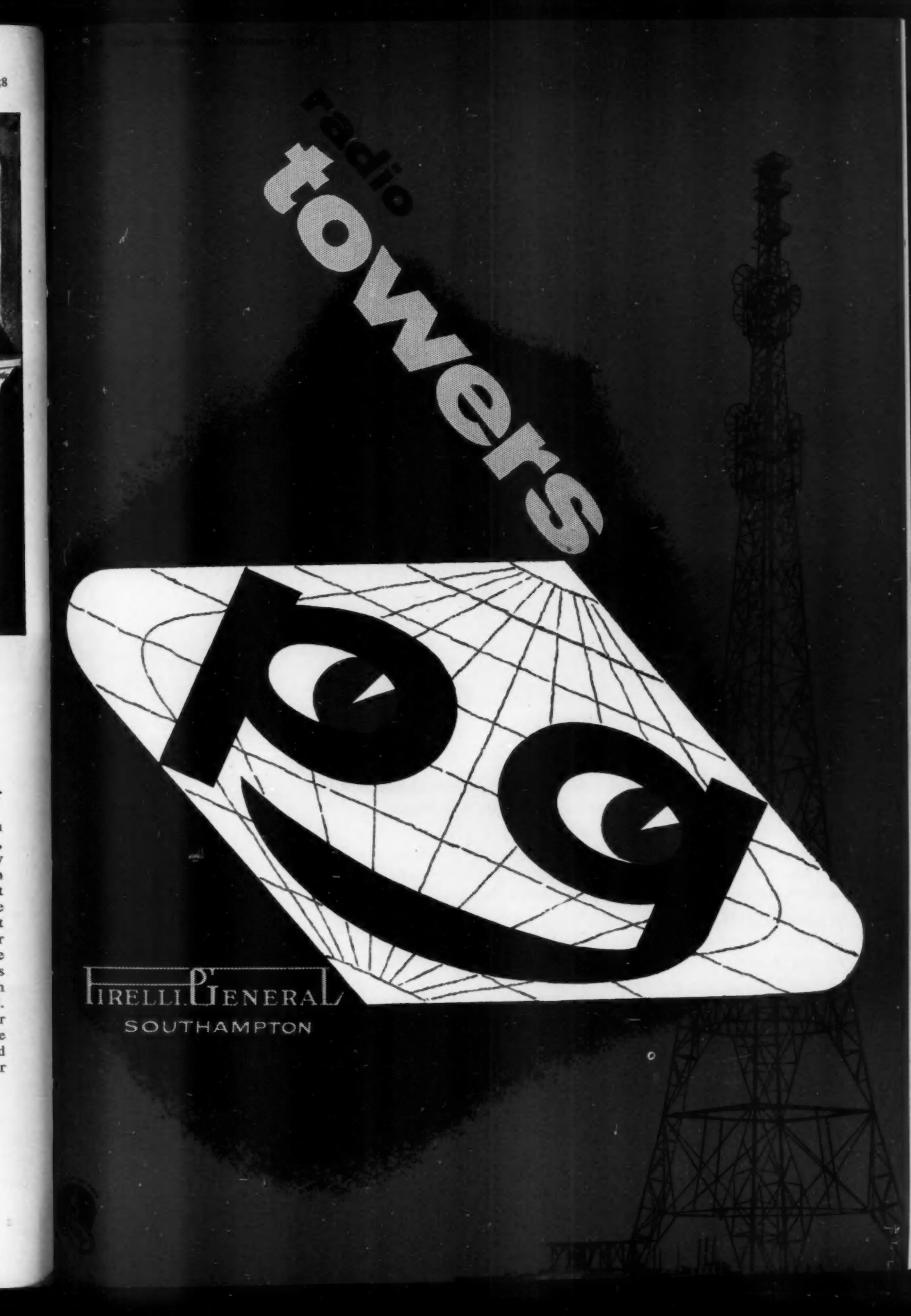


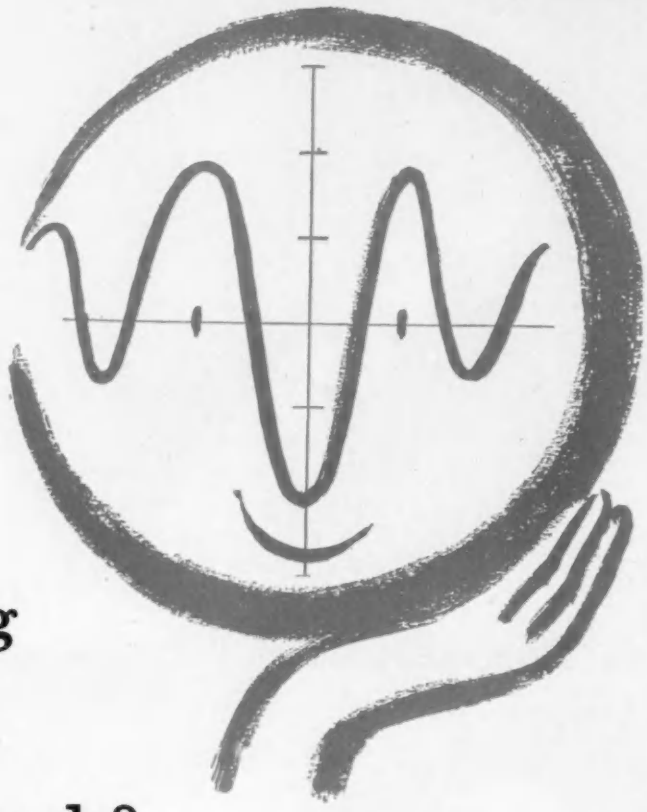
Though these are projects which will not be completed for some time, the work of the Central Electricity Generating Board is playing an important part in today's fight against inflation. Power stations are being built now at an overall cost no greater than in 1948—£50 per kilowatt installed. And, although the output capacity of the industry has doubled since 1948, the increase in manpower is only about one-third.

By providing today for the power we shall need in years to come, the Central Electricity Generating Board is building a secure foundation for our future prosperity.

THE CENTRAL ELECTRICITY GENERATING BOARD

C·E·G·B


radio
towers
PIRELLI GENERAL
SOUTHAMPTON



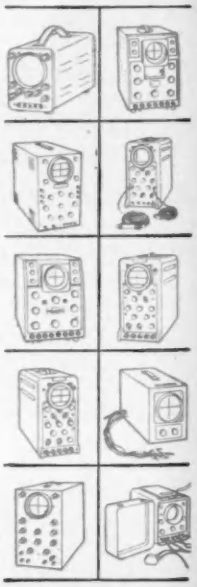
Thinking about an oscillograph?

If you are experienced in the design of high quality instruments, our Technical Director would be glad to hear from you.

FOR USE IN ELECTRONICS? From the wide range of single and double-beam instruments, a model is available to suit the requirements of all sections of this expanding industry.

IN INDUSTRY? Diverse industries are finding solutions to their design and production difficulties with the aid of the Cathode Ray Oscillograph. Our Technical Advisory Service will be pleased to help you with your specific problem.

IN SPECIALISED FIELDS? Unusual types of oscillograph have been designed for specialised applications in the Hydraulic, Marine and Ultrasonic fields. We shall be pleased to consider specific development projects.



For technical information, write to:

COSSOR INSTRUMENTS LIMITED

The Instrument Company of the Cossor Group

COSSOR HOUSE, P.O. BOX 64, HIGHBURY GROVE, N.5, ENGLAND
Telephone: CANonbury 1234 (33 lines) Telegrams: COSSOR, NORPHONE, LONDON Codes: BENTLEY'S SECOND Cables: COSSOR, LONDON
TAS/CI.I

'Superform' switchboards

for all industrial distribution schemes

One of seventeen composite 'Superform' switchboards installed at the Velindre Works of the Steel Company of Wales to the specification of McLellan and Partners, Consulting Engineers.

Composite boards can be supplied covering all the requirements of modern M.V. systems, the range of equipment including:—

- ★ Air circuit-breakers up to 3000 amps.
- ★ Off-load isolators up to 3000 amps.
- ★ Fuse-switches up to 750 amps.
- ★ Contactor gear for motor starting or other duty
- ★ Distribution fuseboards
- ★ Instruments, meters and relays of all types

PLUS

- ★ Modern styling and pleasing appearance
- ★ Unique design features giving increased safety to operating personnel
- ★ Easy access for cabling and maintenance
- ★ Fault making capacities up to 50 MVA at 440 volts
- ★ Complete short-circuit protection

'ENGLISH ELECTRIC'

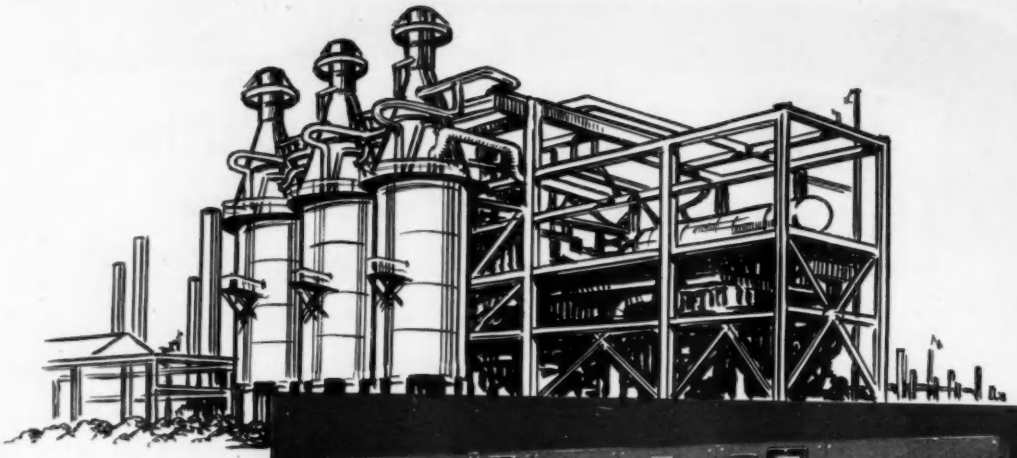
fusegear

THE ENGLISH ELECTRIC COMPANY LIMITED, MARCONI HOUSE, STRAND, LONDON, W.C.2

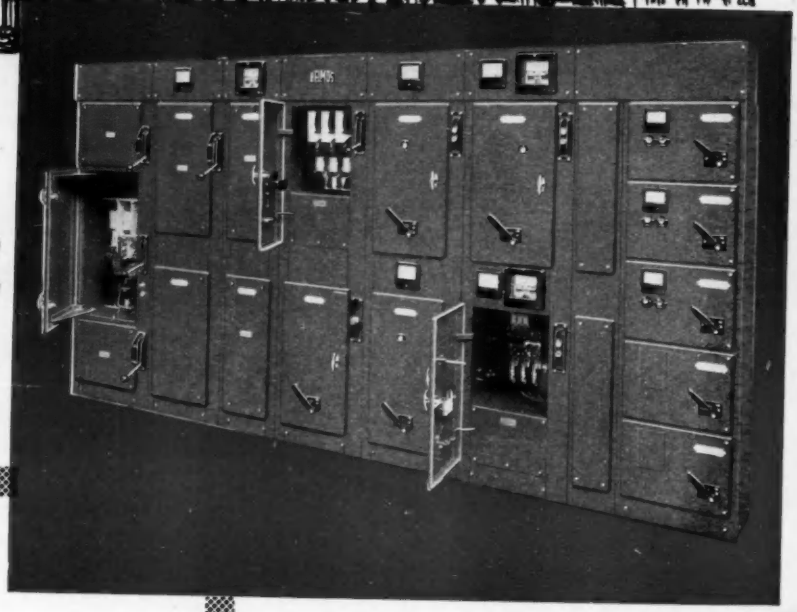
Fusegear Division, East Lancashire Road, Liverpool, 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL ACCRINGTON

FG.32 D8



BELMOS
serves the chemical industry



Type GMB Flameproof remote push button station for use in areas where an explosion hazard exists. Buxton Certified flameproof for groups I, II and III gases

The Belmos company has played a major part in the replacement of batch processing with the newer method of continuous process production by placing at the disposal of the chemical engineer motor control gear designed to meet the most exacting conditions of control in chemical manufacture.

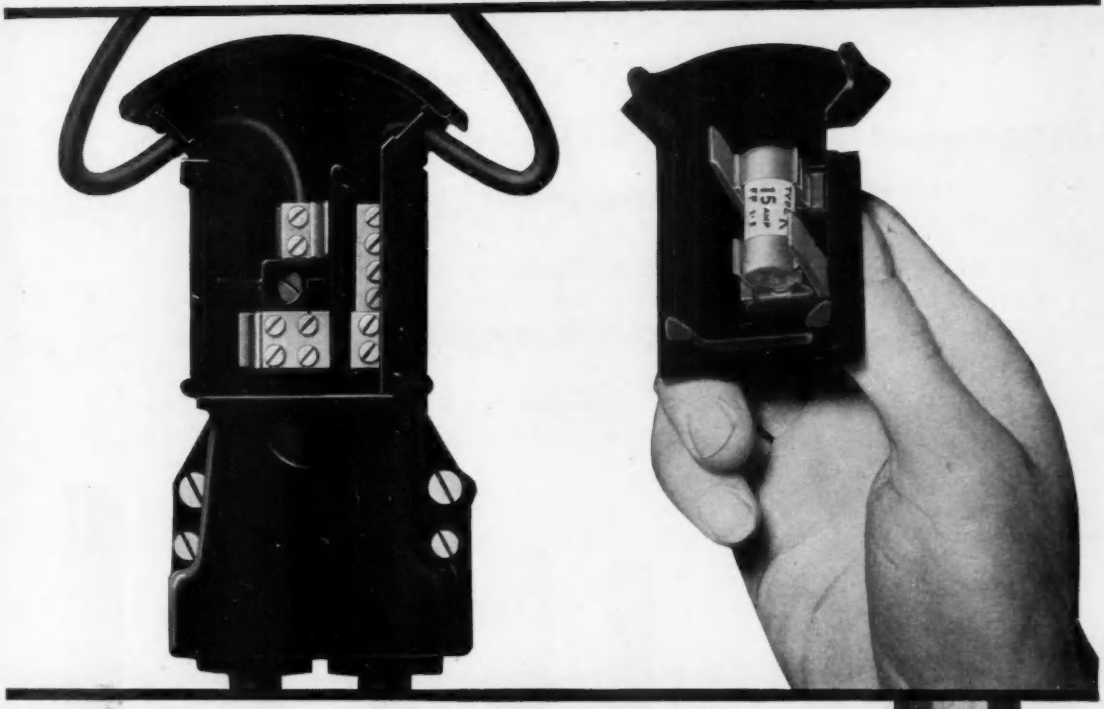
Sound design, good appearance, ease of installation, ability to extend and modify as required—those features and comprehensive test facilities ensure a range of control gear in complete harmony with the best modern industrial practice.

the Belmos company limited

BELLSHILL LANARKSHIRE

LONDON GLASGOW BIRMINGHAM NEWCASTLE MANCHESTER SHEFFIELD CARDIFF

for street lighting columns



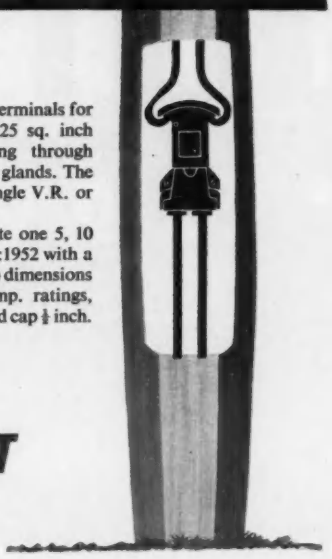
This cutout has a moulded, three part, fire-resistant case comprising: body, sealing chamber cover and combined front cover and fuse carrier.

The body is cowled and cable exits are inclined downwards to prevent the ingress of moisture via the outgoing single cables. Cable entries and exits are closed by knockouts.

TECHNICAL DATA

The cutout can be supplied with terminals for one or two twin cables up to 0.0225 sq. inch (P.I.L.C. or P.V.C.S.W.A.), entering through either rubber bushes or brass wiping glands. The outgoing terminals each take one single V.R. or P.V.C. insulated cable up to 7/.029.

The fuse carrier will accommodate one 5, 10 or 15 amp. H.B.C. fuse link to BS.88:1952 with a duty rating of category 440 AC4 and to dimensions included in BS.1361:1947 for 30 amp. ratings, namely: length 1¼ inch, diameter of end cap ¼ inch.

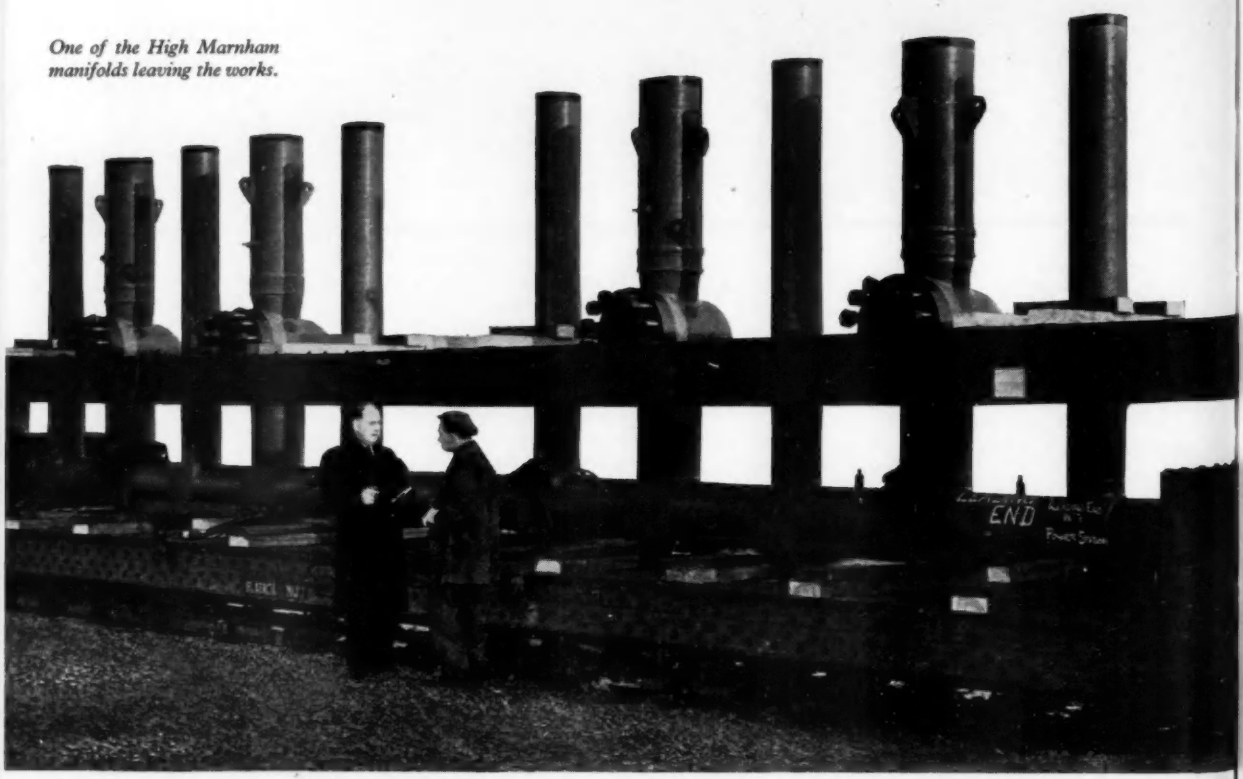


BICC DOUBLE POLE *INSULATED CUTOUT*

BRITISH INSULATED CALLENDER'S CABLES LIMITED 21 Bloomsbury Street, London W.C.1.

CONTROLLED

The most advanced design steam raising units to be built by International Combustion for the Central Electricity Generating Board —the five 200MW units for High Marnham Power Station and the 550MW unit for Thorpe Marsh Power Station —will employ the controlled circulation system.



One of the High Marnham manifolds leaving the works.

CIRCULATION

STUDY THESE FEATURES

- **POSITIVE CIRCULATION** Positive and adequate circulation is assured to each and every tube, irrespective of firing rate.
- **LOWER STRESSES** The smaller bore tubes which are used in this system permit thinner walls and lower metal temperatures.
- **QUICKER STARTING** Positive circulation both from cold or banked conditions ensures equal and even temperatures throughout the unit.
- **ECONOMY** The effective use of heating surfaces and their disposition permit lighter structures, with economy of space occupation and civil engineering costs.

INTERNATIONAL COMBUSTION LIMITED

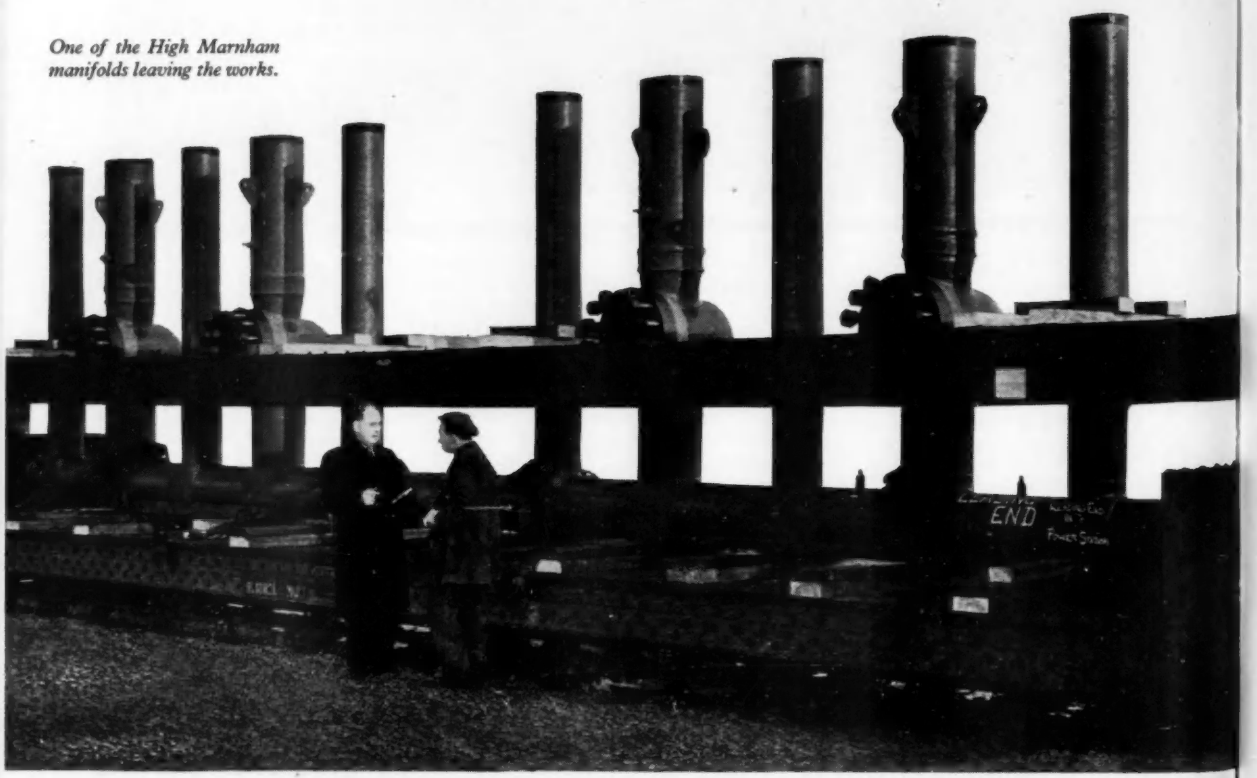
LONDON OFFICE: NINETEEN WOBURN PLACE WC1 · TELEPHONE TERMINUS 2833 · WORKS: DERBY

Member of Atomic Power Constructions Ltd. One of the five British Nuclear Energy Groups

TGA 9673A

CONTROLLED

The most advanced design steam raising units to be built by International Combustion for the Central Electricity Generating Board —the five 200MW units for High Marnham Power Station and the 550MW unit for Thorpe Marsh Power Station —will employ the controlled circulation system.



One of the High Marnham manifolds leaving the works.

CIRCULATION

STUDY THESE FEATURES

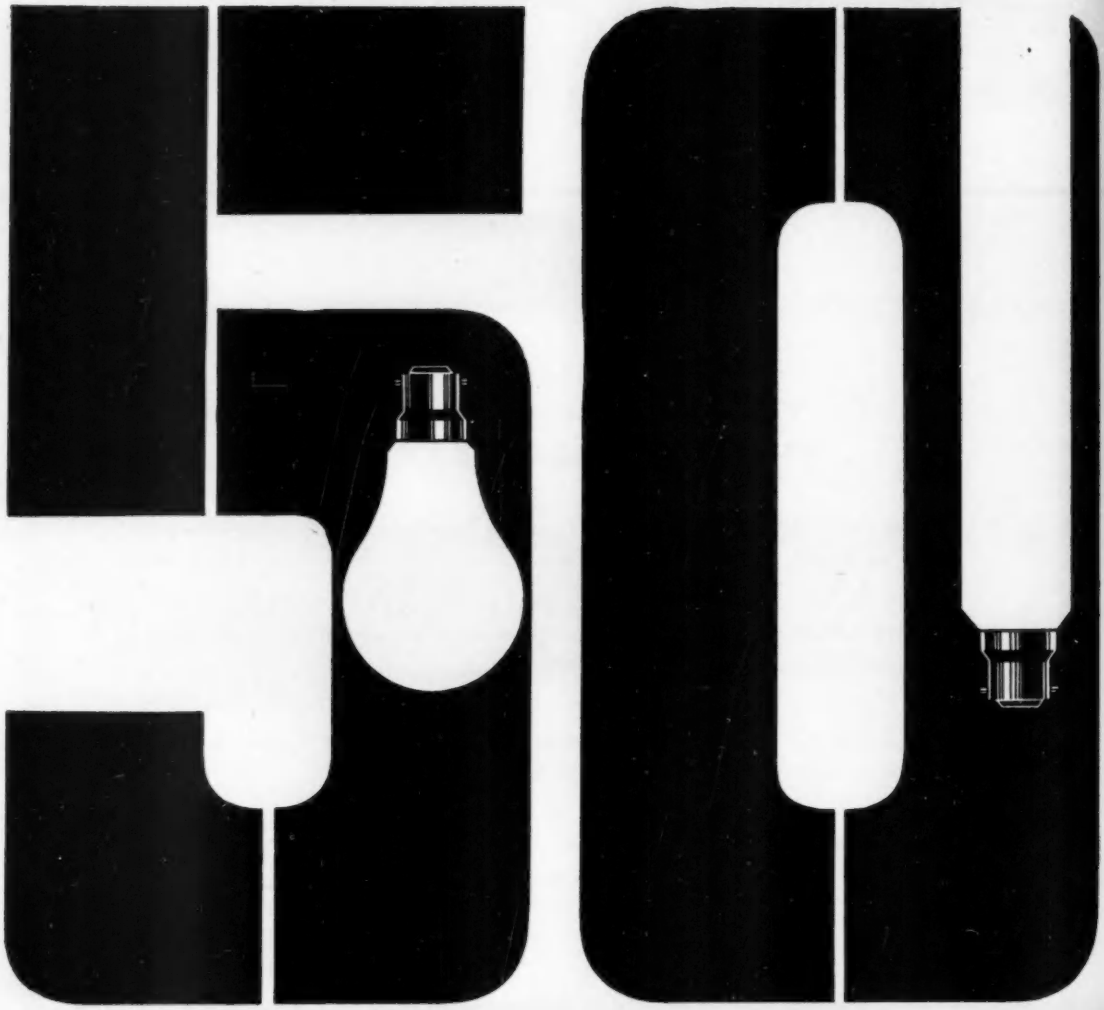
- **POSITIVE CIRCULATION** Positive and adequate circulation is assured to each and every tube, irrespective of firing rate.
- **LOWER STRESSES** The smaller bore tubes which are used in this system permit thinner walls and lower metal temperatures.
- **QUICKER STARTING** Positive circulation both from cold or banked conditions ensures equal and even temperatures throughout the unit.
- **ECONOMY** The effective use of heating surfaces and their disposition permit lighter structures, with economy of space occupation and civil engineering costs.

INTERNATIONAL COMBUSTION LIMITED

LONDON OFFICE: NINETEEN WOBURN PLACE WC1 · TELEPHONE TERMINUS 2833 · WORKS: DERBY

Member of Atomic Power Constructions Ltd. One of the five British Nuclear Energy Groups

TCA 5G78A



50 years of bright selling

Elasta's Golden Jubilee represents an achievement in the field of high performance lighting. Homes, offices, factories everywhere are brighter with Elasta lamps.

Tungsten Filament and Fluorescent

Elasta LAMPS

POPE'S ELECTRIC LAMP CO. LTD. *Head Office: CENTRAL HOUSE, 142 Central Street, London, E.C.1*

Telephone: CLErkenwell 2402-5 Telegrams: DURAMENTUM CENT LONDON

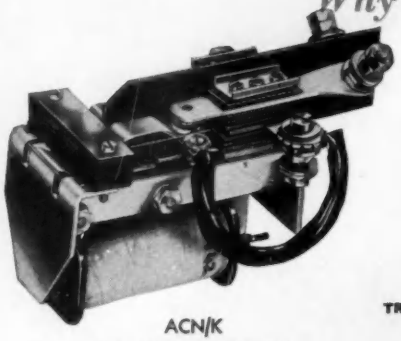
THE SHEFFIELD TWIST DRILL AND STEEL CO. LTD. SHEFFIELD, ENGLAND

DORMER DRILLS ARE OBTAINABLE FROM YOUR USUAL ENGINEERS' MERCHANTS

INSTANTA RELAYS

MODELS from our NEW RANGE

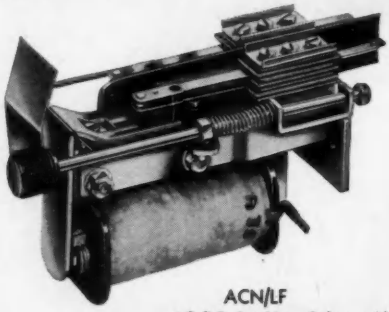
The others will interest you.
Why not get in touch?



ACN/K
Heavy duty AC-DC Relay
(switching up to 30 amps)

TROPICAL FINISH WHEN REQUIRED

Details of other types are available on request



ACN/LF
AC-DC Latching Relay with flag indicator
(switching up to 10 amps)

MAGNETIC CONTROLS LTD.

24 RITHERDON ROAD, LONDON, S.W.17
Tel.: BALham 0399
AND AT INSTANTA WORKS, UPPER STONE STREET, MAIDSTONE. Tel.: Maidstone 51485

RESISTANCE WIRES

TOPHET

STAINLESS STEEL WIRES

The 'Tophet' range of resistance materials is eminently suitable for use under the most exacting conditions as the physical and mechanical properties always remain constant, ensuring long and efficient service.
Our RESISTANCE HANDBOOK gives complete electrical and physical data regarding 'Tophet' resistance wires, stainless steels and ultra fine wire, as well as particulars of our 'Truflex' thermostatic bimetal.

Manufactured by **GILBY-BRUNTON LIMITED**
HEAD OFFICE & WORKS: SEAMILL, MUSSELBURGH, SCOTLAND
Telephone: Musselburgh 2369
LONDON OFFICE: 47 WHITEHALL, S.W.1. *Tel: WHitehall 6058*

The **APPELBE "BULB FIXER"**

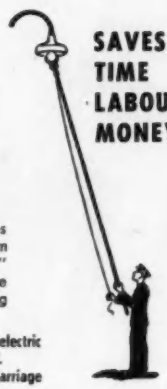
NO LADDERS REQUIRED

Telescopic appliance for fixing and removing electric bulbs. Any reasonable height can be reached.
Made of Aluminium and can be carried with ease on any cycle.

STANDARD MODEL
for 60 to 200 watt lamps at 16' 6" from ground. 6' 0" closed. 12' 0" extended. Weight 3 lb. Cycle clips and Extension Tubing supplied.

"A" MODEL
for 200 to 500 watt lamps E.S. Caps at 20' 0" from ground. 7' 0" closed. 16' 6" extended. Weight 5½ lb. Cycle clips and Extension Tubing supplied.

Used by the leading corporation and electric light companies throughout the world.
Prices and particulars on request. Carriage Paid in Great Britain.



SAVES TIME LABOUR MONEY

J. F. APPELBE & CO. LTD.

GREAT UNION STREET, HULL
Telephone 33522, 31212 and 8725. Telegraphic Address: "Appelbeco, Hull

tailor made by BACKER today may be tomorrow's standard

TUBULAR SHEATHED HEATING ELEMENTS

Quickly designed expressly for you in

INCONEL
INCOLOY
MILD STEEL
STAINLESS STEEL
MONEL
COPPER
ALUMINIUM BRASS
ALUMINIUM BRONZE
& NICKEL

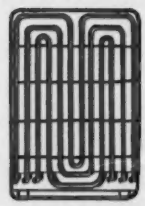
Backer

1000W. Infra Red Radiator Element

1500W. Glue Bath Heater

1000W. Silica Gel Reactivating Element

2250W. Side Entry Still Heater


5000W. Industrial Hotplate

3000W. Twin-Circuit Washing Machine Element

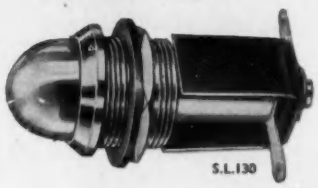
BACKER ELECTRIC COMPANY LIMITED
ROTHERHAM • YORKS • *Telephone: Rotherham 3184.*

Arcolectric
Signal Lamps

S.L.100

S.L.160

S.L.162


S.L.130

Neon for 80-600 volts

S.L.160 and **S.L.162**: New miniature low cost neon signal lamps. ½" hole fixing. Completely sealed against moisture.

Low Voltage

S.L.130: New high quality design for M.B.C. (M.C.C.) bulbs.

Also available with neon

Mains

S.L.100: For B.C. sign lamps.

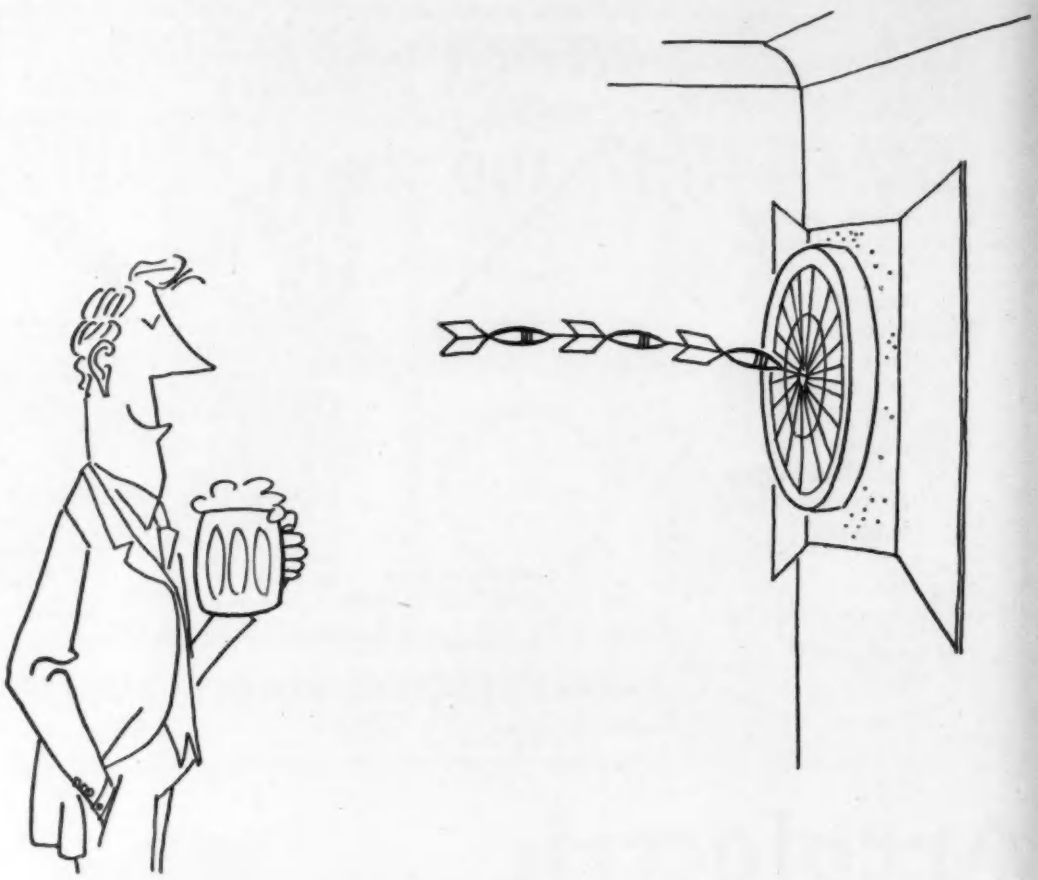
S.L.170: For S.B.C. lamps.

Samples of any of above three new products to manufacturers for design purposes AT ONCE—WITHOUT CHARGE—on request

Write for Catalogue No. 131

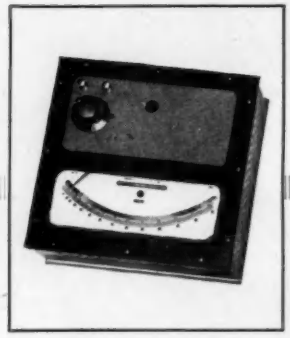
ARCOLECTRIC SWITCHES · LTD

CENTRAL AVENUE, WEST MOLESEY, SURREY. Tel.: MOLESEY 4336



How accurate need you be . . . ?

Including, as it does, instruments from Industrial grade upwards, the Weston range certainly provides just the accuracy needed for the work in hand. Weston Laboratory Standards, as a supreme example, have an accuracy of 0.1 per cent of full scale deflection plus a high level of stability which comes from the infinite care in selection and ageing of materials, in assembly and calibration, which have made Weston supreme. Weston Laboratory Standards, which are available in D.C. Moving Coil or Dynamometer type, are described in leaflets Nos. W35, W36 and W37, copies of which will be sent on request.



SANGAMO WESTON LTD

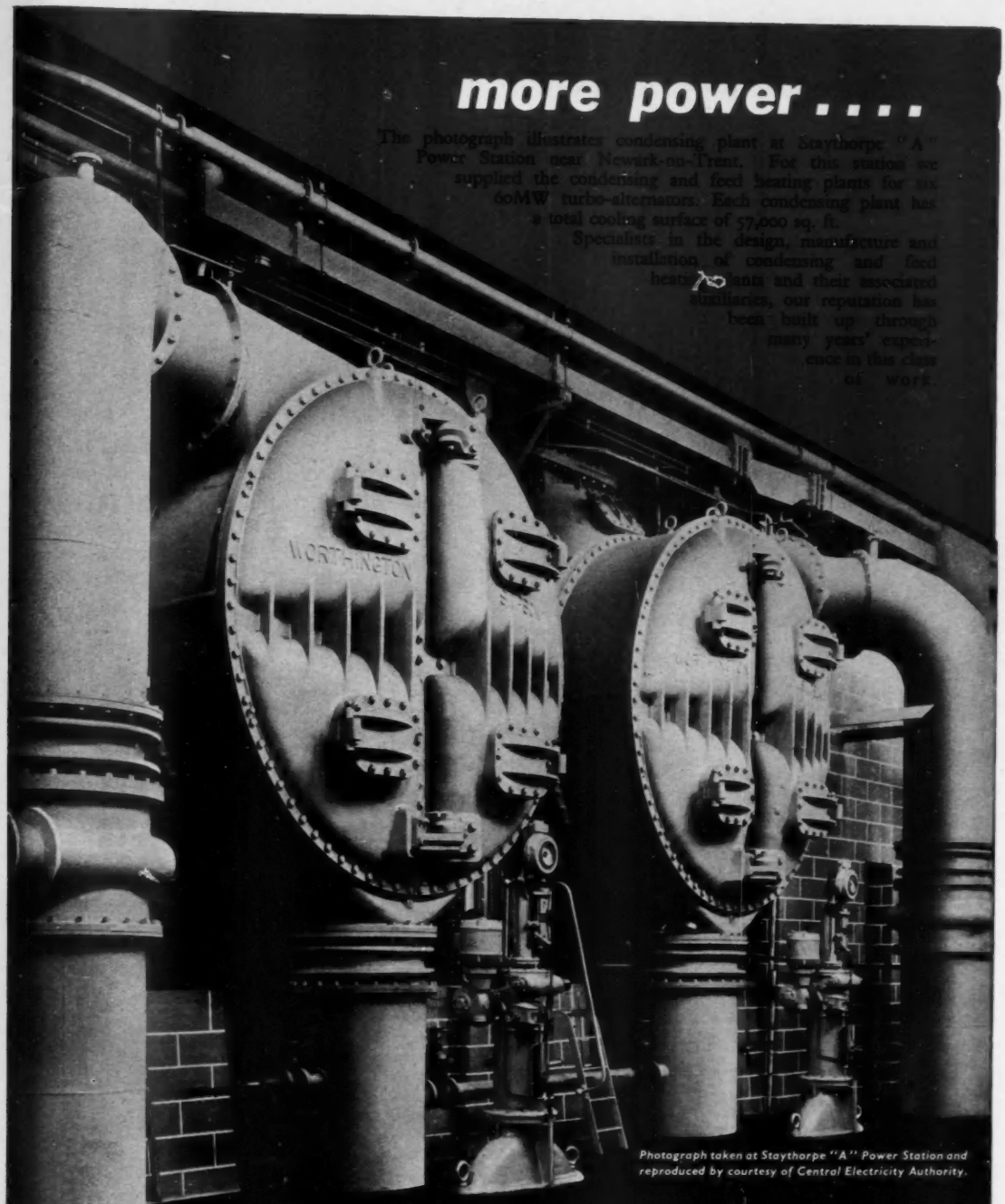
ENFIELD · MIDDLESEX *Tel.* **ENField 3434 (6 lines) & 1242 (6 lines)** *Grams:* **Sanwest, Enfield**

Scottish Factory: Port Glasgow, Renfrewshire, Port Glasgow 41151 · Branches: London, CHAncery 4971 · Glasgow, Central 6208 Manchester, Central 7904 · Newcastle-upon-Tyne, Newcastle 26867 · Leeds, Leeds 30867 · Liverpool, Central 0230 · Wolverhampton, Wolverhampton 21912 · Nottingham, Nottingham 42403 · Bristol, Bristol 21781 · Southampton, Southampton 23238

more power . . . .

The photograph illustrates condensing plant at Staythorpe "A" Power Station near Newark-on-Trent. For this station we supplied the condensing and feed heating plants for six 60MW turbo-alternators. Each condensing plant has a total cooling surface of 57,000 sq. ft.

Specialists in the design, manufacture and installation of condensing and feed heating plants and their associated auxiliaries, our reputation has been built up through many years' experience in this class of work.



Photograph taken at Staythorpe "A" Power Station and reproduced by courtesy of Central Electricity Authority.

Worthington-Simpson

CONDENSING PLANT · FEED SYSTEMS · AUXILIARIES

WORTHINGTON-SIMPSON LTD · NEWARK · NOTTS

NEW ENGLISH ELECTRIC

Vee-Line

Radiant Hotplates

available in 6¼" and 8" diameters

New hinged coil means easier, more convenient cleaning. Made specially to cope with spilled liquids. Coil swivels up for easier cleaning of new, deeper reflector plate.

Maximum contact area ensures fast boiling. Wide flat-topped coil provides a bigger contact area. Ensures quicker, lower-cost cooking.

Exclusive flat coil design guarantees efficiency, long life. Robust construction keeps it free from distortion due to expansion and contraction.

The ENGLISH ELECTRIC Vee-line Radiant Hotplate is designed to conform fully to the EDA Interchangeability Specification for all makes of cookers.

Send now for full details of the most advanced Radiant Hotplate on the market.

IN FUTURE FIT **vee-Line**

THE ENGLISH ELECTRIC COMPANY LIMITED, DOMESTIC APPLIANCE DIVISION, EAST LANCASHIRE ROAD, LIVERPOOL, 10

Pocket size... pocket wise!

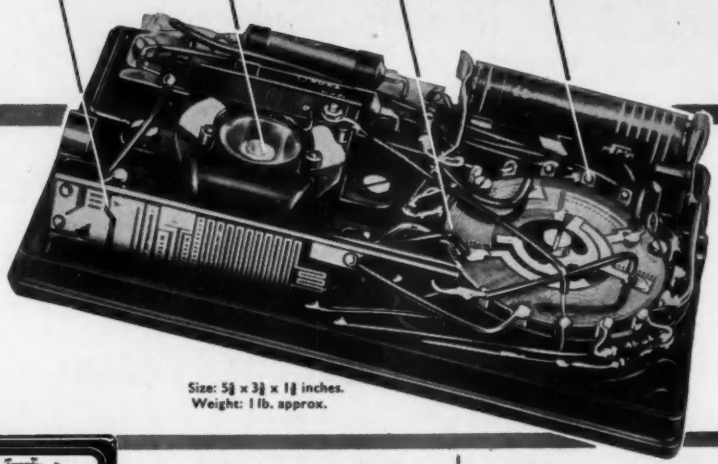
This sturdy multi-range test meter is remarkable for the wide range of test facilities which have been so neatly incorporated. Full advantage has been taken of printed resistor techniques to produce a compact instrument of low weight.

Printed resistance panel for universal meter shunt.

Composite printed resistors and auxiliary switch.

Meter movement is enclosed to give protection against the infiltration of dust.

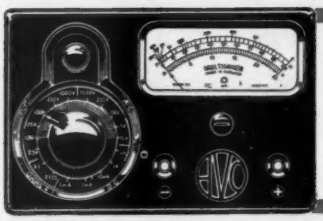
Robust range switch similar to that used in the famous Avo-Meter. Eighteen fixed silver-plated contacts embedded in a ring of high-grade moulding material are swept by a double contact rotor arm.



AVO

Regd. Trade Mark.

Size: 5¾ x 3¾ x 1¾ inches.
Weight: 1 lb. approx.



7 D.C. Voltage Ranges: 0-1,000 V.

5 A.C. Voltage Ranges: 0-1,000 V.

5 D.C. Current Ranges: 0-1A.

2 Resistance Ranges: 0-20,000Ω. 0-2MΩ.

Sensitivity:
10,000Ω/V on D.C. voltage ranges.
1,000Ω/V on A.C. voltage ranges.

Accuracy:
3% of full scale value on D.C.
4% of full scale value on A.C.

For a small additional charge, instruments can be supplied to a higher degree of accuracy.

THE MULTIMINOR

19 Ranges · Single Knob Control · £9:10s.

List Price:

Complete with test leads and clips. Leather case if required 32/6.

● Write for fully descriptive leaflet.

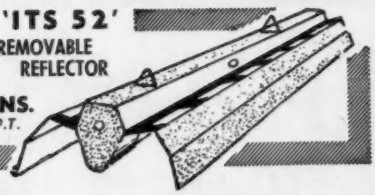
AVO Ltd. AVOCET HOUSE · 92-96 VAUXHALL BRIDGE ROAD · LONDON · S.W.1.

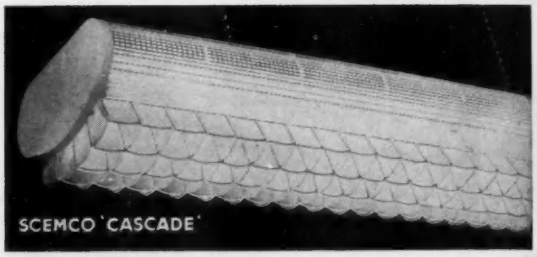
VICtoria 3404 (9 lines)

SCEMCO.... RIGHT FOR LIGHT—

STANDARD 80 watt CIRCULAR FLUORESCENT

'ITS 52'
REMOVABLE REFLECTOR
6 GNS.
No P.T.





CIRCULAR LAMPS
available in Peach, Daylight, White, Warm White, Natural.
Incorporating the finest control gear.
£4.4. *Less lamp.*
Plus 4/6d. P.T.
Subject Trade Discount.

'CASCADE'
The 'Cascade' fitting embodies a highly efficient diffuser which is a revelation in light output.
All fitted with finest fluorescent gear.

SCEMCO 'CASCADE' TWIN LAMP 2' 40w £10.17.6 List
TWIN LAMP 4' 40w £14.14.0 List
TWIN LAMP 5' 80w £15.15.0 List
Plus P.T.

from your usual wholesaler or:—

Send for details of SCEMCO EXCLUSIVE LOUVERING

SCEMCO 'SCEMCO HOUSE' 53 GREAT EASTERN ST. LONDON E.C.2
Telephone: SHOREDITCH 3800

1908 — 50 YEARS — 1958

OF RELIABLE SERVICE IN THE DISTRIBUTION

of

EVERY DESCRIPTION

of

ELECTRICAL MATERIAL

for

EVERY SITUATION

We Handle High-Class Material Only

Our Addresses:

Liverpool:	Manchester:	Carlisle:	Birkenhead:	Workington:
1-17 Stanley Street	72 Chapeltown Street	Paternoster Row	94 Chester Street	Oxford Buildings Oxford Street
Telephone: Central 5491 (10 lines)	*Telephone: Ardwick 5292 (4 lines)*	*Telephone: 26231-2*	*Telephone: 4340-1*	*Telephone: 139*

DOWNES & DAVIES LTD.

The GEO range of ELLISON switchgear

Technical Data

CIRCUIT BREAKERS

A.S.T.A. TESTED
TO BS. 116:1952

Horizontally isolated, drawout type for service voltages of up to 660

CURRENT RATING	BREAKING CAPACITY 600 VOLTS M.V.A.	BREAKING CAPACITY 600 VOLTS kA	BREAKING CAPACITY AT 400 VOLTS	MINIMUM COIL SIZE TO GIVE STATED M.V.A.	OVERALL WIDTH OF CIRCUIT BREAKER
400 AMPS	37·5	36	25 M.V.A.	200 AMPS	20 INCHES
600 ,,	45	43·3	30 ,,	400 ,,	24¼ ,,
800 ,,	45	43·3	30 ,,	600 ,,	25⅞ ,,
1200 ,,	45	43·3	30 ,,	600 ,,	28⅜ ,,

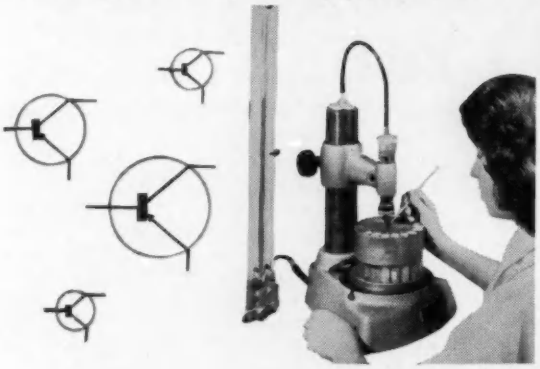
TRADE (E) MARK
GEORGE ELLISON
LIMITED
BIRMINGHAM ENGLAND

For further information please write for Leaflet C.L.244

Continuing a Tradition

775

creating the right atmosphere No. 2

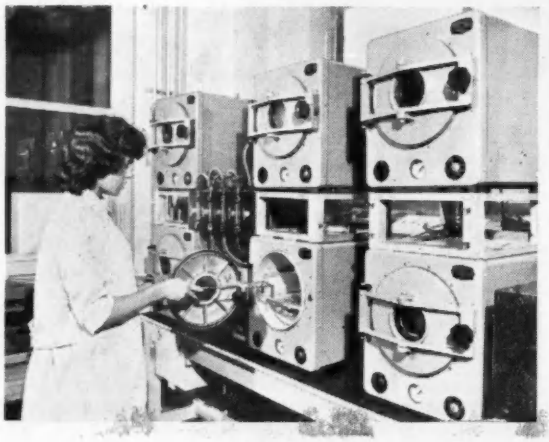


transistor manufacture

In the manufacture of transistors, Siemens Edison Swan Limited use a Birlec direct dehumidifier to maintain dry, dust-free conditions for the preparation and final assembly of germanium wafers. Maintaining 10% relative humidity conditions, the direct dehumidifier ensures accurate grading of the wafers according to thickness, and perfect electrical contact between the wafers forming emitter, base, and collector in the transistor.

Above : Grading germanium wafers prior to assembly into transistors

Below : Drying germanium wafers in vacuum ovens



DRYER DIVISION OF

BIRLEC LIMITED

AN A.E.I. COMPANY

ERDINGTON · BIRMINGHAM · 24

BIRLEC DIRECT DEHUMIDIFIERS FOR AIR CONDITIONING

LONDON · SHEFFIELD · GLASGOW · NEWCASTLE-ON-TYNE

SM/B3146/D/AC

FLEXIBLE TERMINAL BLOCKS BY METWAY

METWAY "FLEXWAY"

Manufactured in NYLON P.V.C. RUBBER

Also available RIGID BAKELITE BLOCKS

"POLYWAY" and "RUBBERWAY"

Write for Brochure NDQ/10/ER

METWAY WORKS • KEMPTOWN • BRIGHTON

PRESSPAHN, LIMITED

Manufacturers of

ELECTRICAL WELLSTEAD INSULATION

ELECTRICAL INSULATING MATERIALS

PRESSPAHN, LTD - BRADFORD - YORKS

Phone: Bradford 25135 PBX. Grams & Cables: "Presspahn, Bradford"

ENGRAVING & ETCHING EQUIPMENT

Will etch on any metal including hardened steel. Ideal for all difficult marking jobs. Invaluable to all engineers. Send for interesting booklet —25.X.

Runbaken MANCHESTER 1 · ENGLAND

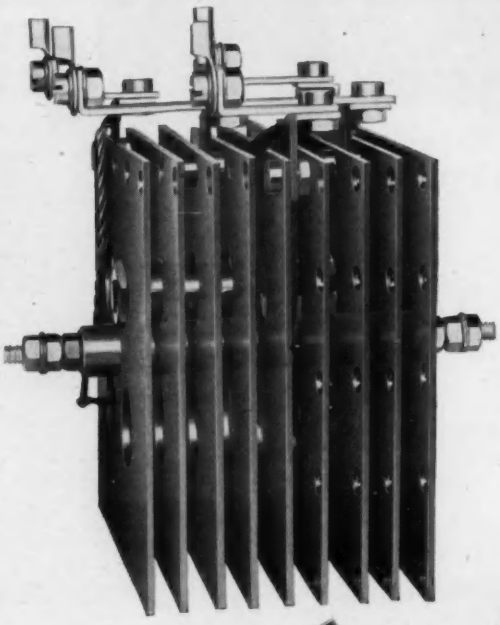
GERMANIUM POWER DIODES

The English Electric Valve Company announce a new addition to their range of Germanium Power Diodes. This is the VA719 which at its 35°C rating of 20 amps has a forward drop of only 0.5 volt.

These diodes are extremely efficient, mechanically robust, moisture proof, completely reliable and low in cost.

The diodes can be supplied in stacks with cooling fins, as illustrated, for almost any circuit arrangement.

The following list gives some typical examples of stacks together with maximum R.M.S. input and D.C. output figures:—



TYPICAL RECTIFIER STACKS
(Operation at 35°C Ambient)

MAXIMUM RATINGS					
CIRCUIT	STACK TYPE NO.	RMS INPUT VOLTS	DC VOLTS	OUTPUT AMPS	LIST PRICE★
SINGLE PHASE FULL WAVE C.T. (2 Diodes)	19E2-1-1 19F2-1-1 19G2-1-1	28 + 28 21 + 21 14 + 14	25 18 12	40 40 40	£10. 0.0d £ 7.15.0d £ 5. 7.6d
SINGLE PHASE BRIDGE (4 Diodes)	19E3-1-1 19F3-1-1 19G3-1-1	56 42 28	49 37 24	40 40 40	£20. 0.0d £15.10.0d £10.15.0d
		Phase Line			
THREE PHASE HALF WAVE (3 Diodes)	19E4-1-1 19F4-1-1 19G4-1-1	32.4 56 24.3 42 16.2 28	37 28 18	56 56 56	£15. 0.0d £11.12.6d £ 8. 0.0d
THREE PHASE BRIDGE (6 Diodes)	19E5-1-1 19F5-1-1 19G5-1-1	56 42 28	75 56 37	56 56 56	£30. 0.0d £23. 5.0d £16. 0.0d

This list is by no means complete — series and parallel arrangements are not included — and you are invited to ask for our quotation for your particular requirements.
★ *Special discounts are available for equipment makers and for large quantities.*

'ENGLISH ELECTRIC'

ENGLISH ELECTRIC VALVE CO. LTD. *Chelmsford, England*
Telephone: Chelmsford 3491

AP/121

When solids are to be separated from liquids or gases, acids, or alkalies, there may be an INTERMIT product already in existence, or large numbers can be produced to special design in collaboration with your technicians.

interpose an **INTERMIT** filter, strainer, or gauze

INTERMIT LIMITED 37 Bradford Street, Birmingham 5. Phone: Midland 7961

product of **Birfield** **Group** experience and resources

BIRFIELD INDUSTRIES LIMITED, Stratford House, London, W.1 · Works: INTERMIT LIMITED, Bradford Street, Birmingham

TEMPERATURE CONTROL

by

THE THERMOSTATIC CONTROLS CO.

WE shall be pleased to submit special designs for all domestic and commercial applications, including combination units of heater and thermostat, or safety device.

HEATING ELEMENTS

by

CONTROLLED HEATING UNITS (London) LTD.

Obtainable, complete or separately, from the same factory.

Enquiries to: –

AVENUE ROAD • HAMPTON • MIDDLESEX TEL. MOLESEY 3285/7

For Specialised and Personal Service to the Trade & Industry

NATIONAL ELECTRICAL SUPPLIES CO. LTD.

Stockists and Distributors of

SQUARE D ELECTRICAL CONTROL GEAR

and all leading Electrical Products

Write or 'phone for immediate Service:

NATIONAL HOUSE • 240-242 KING STREET • LONDON • W.6

RIVerside 4655 (12 lines)

BY APPOINTMENT TO HER MAJESTY THE QUEEN MANUFACTURERS OF ELECTRIC LAMPS

'MODULUME'
Brings the sky indoors!

Modulume serves the small and the large shop and provides excellent lighting with economy and comfort.

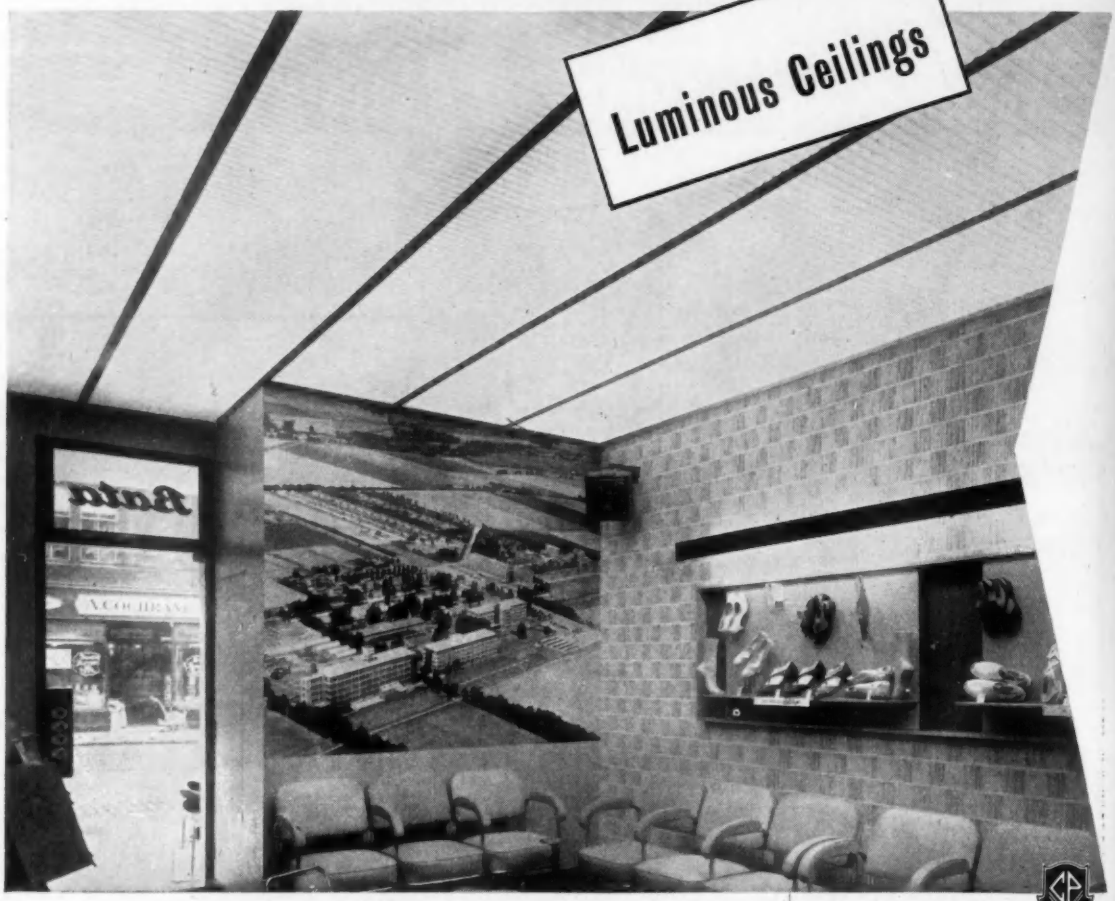
The completeness of 'Modulume' ceilings enabled this shoe shop installation to be carried out in less than two days.

Our advisory service is readily and freely available to you so that problems, simple or complex, can be solved correctly first time.

Crompton

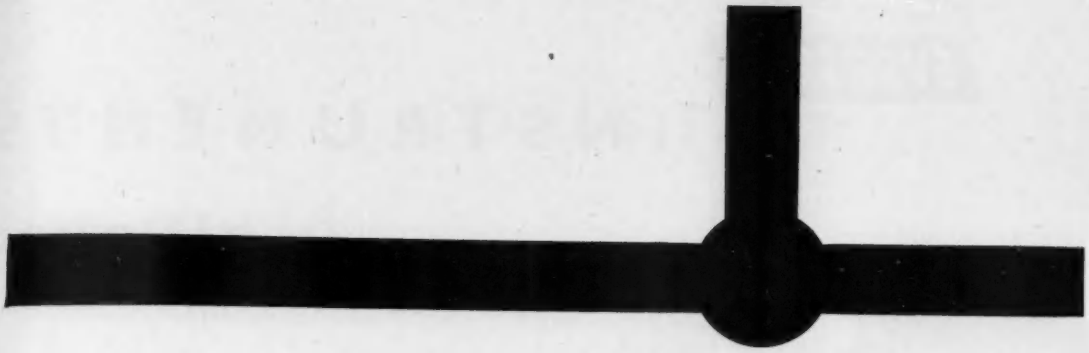
'Modulume'

Luminous Ceilings

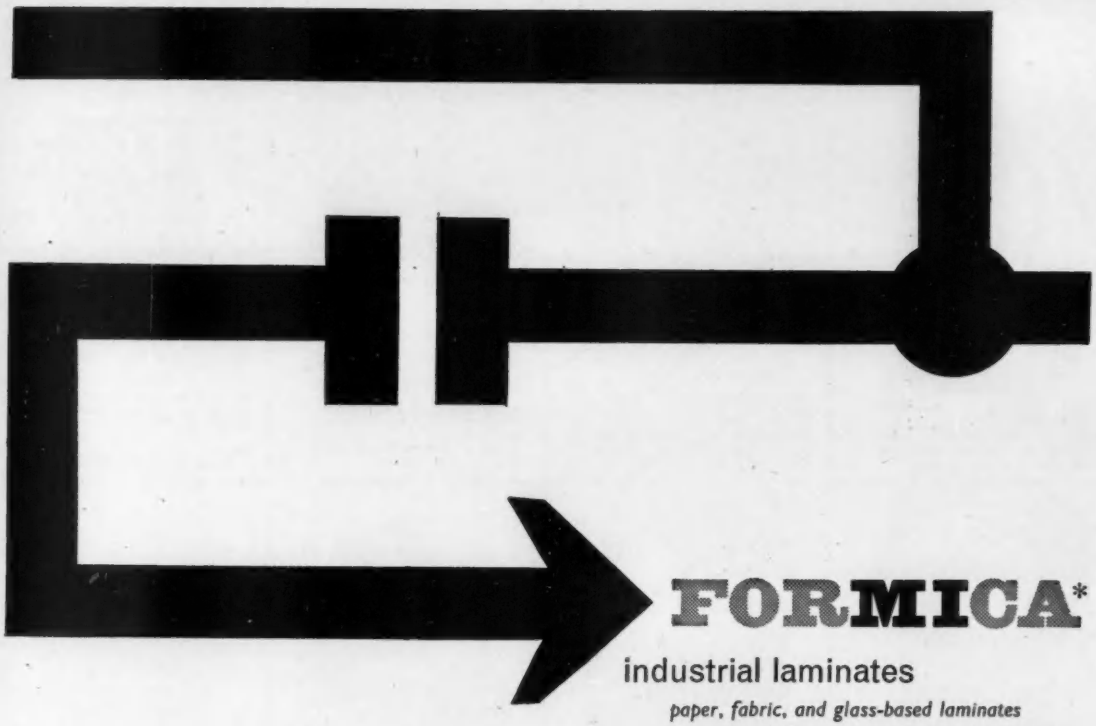


CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.

ELECTRICAL EQUIPMENT



FORMICA for electrical insulation



FORMICA*

industrial laminates

paper, fabric, and glass-based laminates
Copper-clad. Engraving and printed material

FORMICA LTD, DE LA RUE HOUSE, 84/86, REGENT STREET, LONDON W.1

*FORMICA *is a registered trademark*

EVERSHED

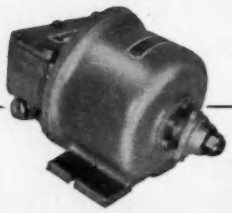
INSTRUMENTS all over

SWITCHBOARD INSTRUMENTS

A wide selection of ammeters, voltmeters and wattmeters. Round or square faced patterns available.

'DIONIC' WATER PURITY TESTERS

An essential instrument for industries where water purity is of prime importance. Detects dissolved impurities in steam or water. Models available for Power Stations, Marine installations or Laboratories.



TACHOMETERS

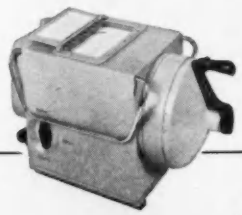
Speed indication for ship, turbine, printing and power shaft revolutions.

THICKNESS GAUGE

This small pencil type gauge can be used for measuring the thickness of non-magnetic coatings such as paints and plating on ferrous bases.
Range 0.0002-0.015 inches.

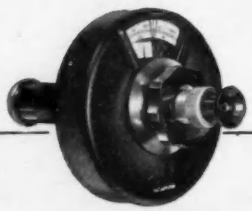
GEOPHYSICAL 'MEGGER' EARTH TESTER

For surveys by resistivity method, ideal in prospecting for mineral deposits, shallow water supplies and depth of bed rock for dam foundations.



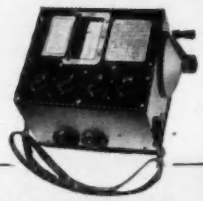
INSULATION TESTERS

'Megger' Insulation and Insulation and Resistance Testers available with testing pressures up to 10,000 volts and ranges up to 100,000 megohms. Hand driven or Mains operated.



OPTICAL PYROMETER

A high precision direct reading instrument for measuring the temperature of visible radiating bodies quickly and accurately without actual contact.

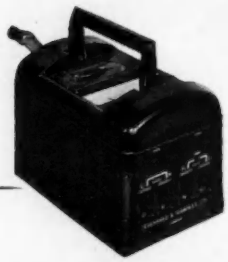


BRIDGE 'MEGGER' TESTER

Combined Insulation Tester and Wheatstone Bridge. Ideal for measuring to a high degree of accuracy, insulation resistance and a wide range of conductor resistances; also fault location on telephone cables.
Testing pressures up to 1,000 volts.
Ranges up to 2,000 megohms.

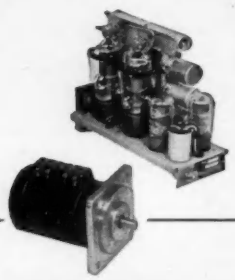
'MEGGER' BOND TESTER

For routine tests on cable bonds, earthing conductor joints, lightning conductors, etc.
Available in two types:
(Aeroplane) 0-0.1 ohms.
(Industrial) 0-100 milliohms.



'MEGGER' EARTH TESTERS

Self-contained instruments for measuring directly the resistance to earth of earth plates and earth specific resistance.
Three different series provide ranges up to 30,000 ohms.



SERVO MECHANISMS

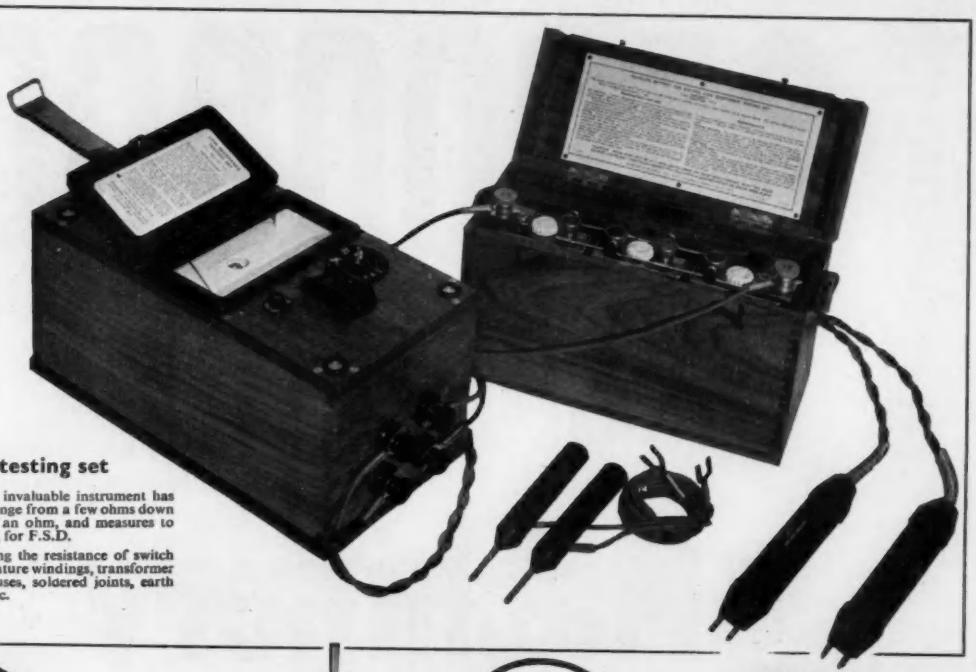
F.H.P. Motors, Amplifiers, Servo Gear Boxes and Tach. generators, available as individual units, or as complete servo-mechanisms designed to customers' specifications for Machine Tool Control, Computers, Medical equipment, etc.

RUDDER INDICATORS

Supplied to shipbuilders throughout the world since 1893.

SERVE INDUSTRY the world

With over 60 years' designing and precision engineering experience, Evershed & Vignoles Ltd. produce the finest electrical testing, measuring and laboratory equipment in the world.



'Ducter'

Low resistance testing set

This highly sensitive and invaluable instrument has a resistance measuring range from a few ohms down to one millionth part of an ohm, and measures to within an accuracy of 1% for F.S.D.

Ideally suitable for testing the resistance of switch contacts, rail bonds, armature windings, transformer windings, copper bars, fuses, soldered joints, earth continuity conductors, etc.

WORKSHOP OHMMETERS

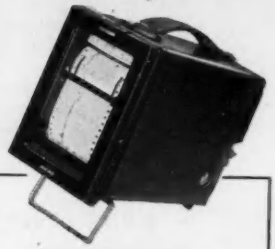
For rapid measurement of insulation and conductor resistance of components during manufacture. A mains operated direct reading ohmmeter. These instruments are available for Switchboard or Bench use.

POLAROGRAPHS

A highly efficient, quick and simple analytical instrument available with or without recording facilities.

PORTABLE INDICATORS

Moving iron or moving coil ammeters, voltmeters and dynamometer wattmeters. Industrial and Laboratory types available.



MINIATURE RECORDER

A compact tapping type instrument suitable for either flush or projecting mounting, or for portable use. Variable chart speeds. Other single and multi-pen types and Quick Response Recorders available.

INSTRUMENTS DIVISION

EVERSHED & VIGNOLES LIMITED • CHISWICK • LONDON • ENGLAND

Telephone: Chiswick 3670 *Telegrams & Cables:* Megger, London, Telex

Choose from £3,000,000 Stocks of Machinery

GEORGE COHEN

SONS AND COMPANY LIMITED

BRITAIN'S LARGEST PLANT & MACHINERY MERCHANTS

MACHINE TOOLS, SHEET METAL MACHINERY, BOILERS, POWER PLANT, ELECTRICAL EQUIPMENT, HYDRAULIC PLANT, RUBBER AND PLASTICS MACHINERY, PROCESS PLANT, CONTRACTORS' PLANT, MOBILE CRANES, LIFTING & MECHANICAL HANDLING EQUIPMENT, CONTRACTORS' TOOLS

THE 600 GROUP OF COMPANIES

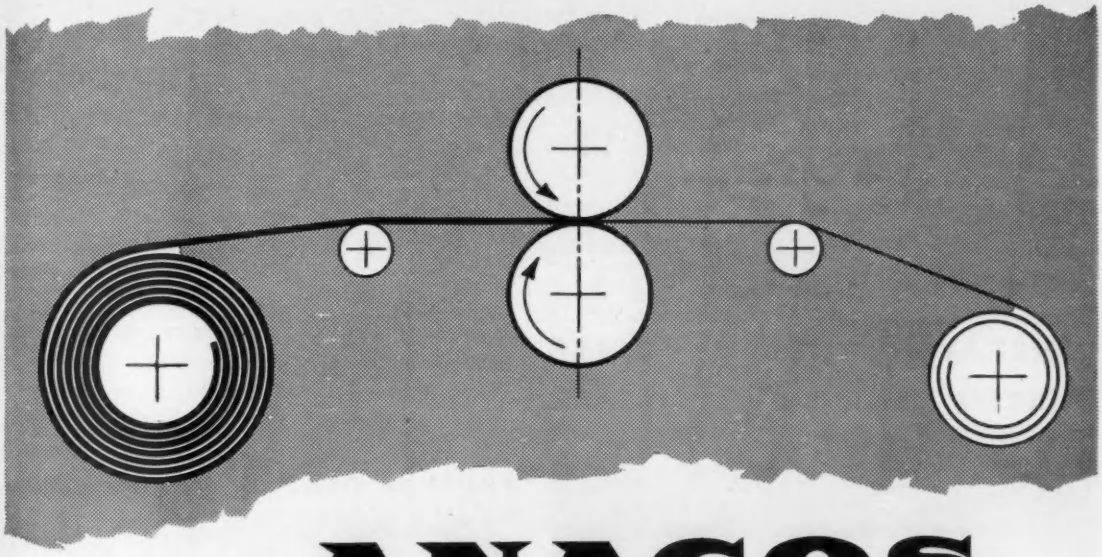
WOOD LANE, LONDON, W.12 — *Tel.: Shepherds Bush 2070. Grams: Omniplant, Telex, London.*

STANNINGLEY, NEAR LEEDS — *Tel.: Pudsey 2241. Grams: Coborn, Leeds*

And at : Kingsbury (Nr. Tamworth). Manchester. Glasgow. Swansea. Newcastle. Belfast. Sheffield. Southampton. Bath.

cross section

Strips rolled or drawn into a variety of sizes, are fed into the annealing furnaces to emerge bright and of uniform perfection. Where then? The journey, were you to follow them would be long and varied, seeing the great variety of uses of copper strip in light and heavy electrical apparatus all over the world. Anywhere, in fact, through a cross section of our times.



ANACOS

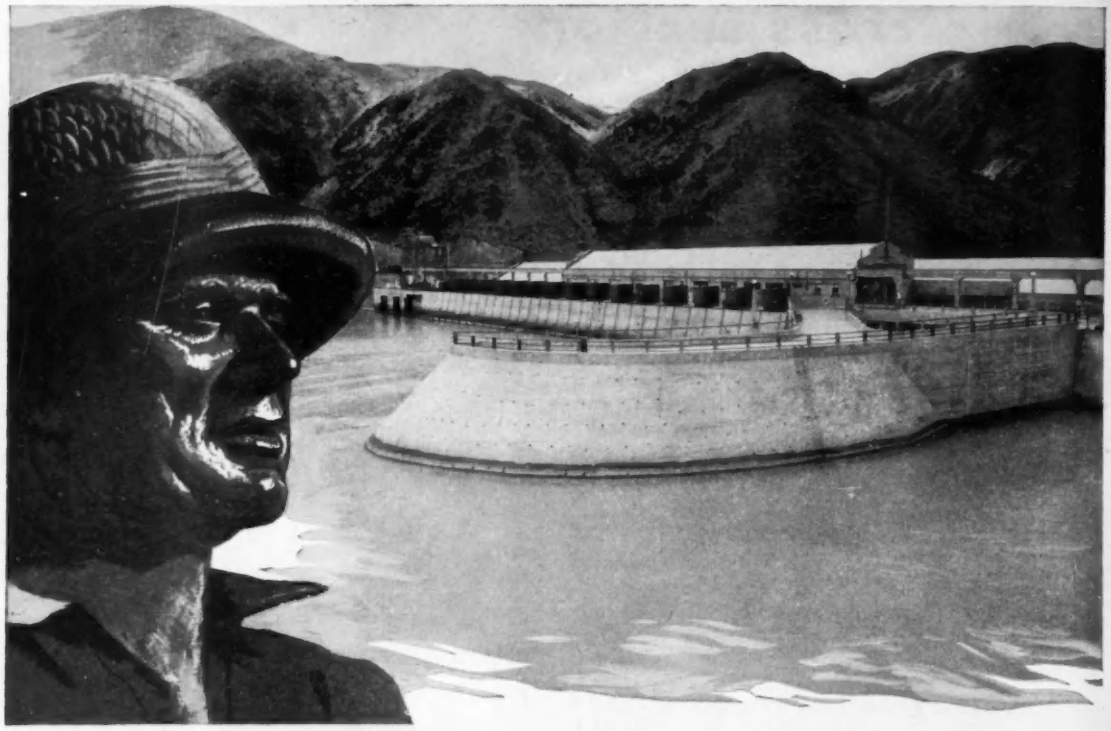
copper strip

Drawn strip, annealed in all sizes for various coverings and readily edge bent to requirements. Rolled strip from ·002" thickness upwards and width up to 5½". For transformer windings, light busbars, switchgear and other electrical apparatus.

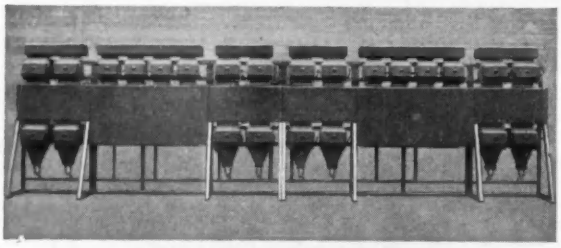
FREDERICK SMITH & COMPANY

ANACONDA WORKS · SALFORD 3 · LANCS

D



WHEREVER THERE'S POWER THERE'S DENNIS SWITCHGEAR



INDUSTRIAL SWITCHBOARDS
An example of medium voltage distribution switchboard for Atomic Power Station.

Dennis heavy duty medium voltage Switchboards are operating with the greatest efficiency all over the world, in tropical, temperate and cold climatic conditions, for the centralised control of all types of lighting, heating and power circuits. Combinations of fully tested H.R.C. Fused Switches to 800 amps. and Circuit Breakers to 2000 amps. are designed to individual requirements and will always provide trouble-free operation, ease of maintenance, saving of space and symmetry of appearance. Dennis Switchgear gives complete satisfaction by offering an extensive range of H.R.C. and Rewireable Fuse Switches, Distribution Boards, Fuses, etc., to the highest standards of electrical engineering practice, ensuring quality with economy.

DENNIS

SWITCHGEAR

HEAVY DUTY FUSE SWITCHES

800 amps. TP and N Fuse Switch, from our heavy duty 'CH' range (60 amp.—800 amp.) tested to 50 MVA. Catalogue No. CH380N.

Ask for Catalouge M.C.4

G. P. DENNIS LTD., SPEKE, LIVERPOOL 19 TELEPHONE: HUNTS CROSS 2241 (5 lines)
LONDON OFFICE: 417 GRAND BUILDINGS, TRAFALGAR SQUARE

CVS—31

FRIDAY
21 NOVEMBER
1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

In This Issue

Cleaning Up the Contracting Industry 941
Progress is being made with the enrolment of approved electrical contractors but the work and aims of the National Inspection Council need the fullest publicity if success is to be achieved

World's Largest Boiler 943
Main features of the 3,750,000 lb/hr boiler which the Central Electricity Generating Board has ordered from International Combustion, Ltd., for installation at the projected Thorpe Marsh power station near Doncaster

Electrification of U.K.A.E.A. Factories 948
As an indication of the growth of electrical demand at these factories the authors of this I.E.E. paper describe the development of the Springfields main supplies. Some of the problems associated with the Windscale pile and Dounreay fast reactor are also referred to

Nationalisation Surveyed 951
A book by Mr. R. Kelf-Cohen points out the ways in which the nationalisation of five industries has fallen short of expectations and suggests remedies. A booklet by the Federation of British Industries goes further in its criticism of nationalisation

Electrical Industries Ball 958
Photographs of some of the large company at last Friday's successful function organised by the Electrical Industries Benevolent Association

Registration of Contractors 963
A summary of the principal subjects included in the latest progress report and the 1957-58 report presented at the annual meeting last Friday

✧ ✧ ✧ ✧

B.E.A.M.A. Publicity Conference	952	**Public Works Exhibition**	973
Letters to the Editor	953	**Generation and Development**	974
Personal and Social	955	**New Electrical Equipment**	976
Views on the News	961	**Financial Section**	978
Automatic Control Equipment	962	**New Patents**	982
Buried Transformers	964	**Next Week's Events**	983
Industrial News	965	**Contract Information**	984
Parliamentary Report	969	*CLASSIFIED ADVERTISEMENTS*	111
Cable Manufacture in Wales	971	*INDEX TO ADVERTISERS*	122

VOLUME 163 NUMBER 21 ✧ *Eighty-Seventh Year of Publication* ✧ FRIDAY PRICE 1s 6d

Editorial, Advertising and Publishing Offices: Dorset House, Stamford Street, London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No. Waterloo 3333 (60 lines). Registered at the General Post Office as a Newspaper. Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home £4 15s 0d; Overseas £5 15s 0d: U.S.A. and Canada $16.00. Cheques and Postal Orders (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD. and crossed "Lloyds Bank."

SINTOX HAS HIGH RESISTIVITY

Volume Resistivity Ohm. Cm. 14° c . . 10^{16}
100° c . . 2×10^{15}
200° c . . 4×10^{14}
300° c . . 3×10^{13}

Due to the high resistivity of Sintox, it is unsurpassed as an electrical insulator and it is widely used for thermionic valve components, high temperature terminations, multi-hole thermocouple tubes and many other applications.

SINTOX

Sintox Technical Advisory Service

This service is freely available without obligation to those requiring technical advice on the application of Sintox Industrial Ceramics. Please write for booklet or any information required enclosing blue print if available.

SINTOX IS MANUFACTURED BY
LODGE PLUGS LTD., RUGBY

Versatility is the Keynote of *Cambridge* Oscillographs

6-element Oscillograph on movable trolley. (Courtesy of the Post Master General)

—each one 'tailor-made' to individual requirements

For more than 60 years CAMBRIDGE have been producing Oscillograph outfits to meet the special and varied needs of the electrical and engineering industries. Available facilities include improved time-marking; vibrator elements for extra low frequencies; panels for voltage control up to 1,000 volts on all channels; motor-driven tachometer; and wide range speed control for camera operation.

Other features include:

- ★ Simplicity of maintenance and high degree of component accessibility.
- ★ Wide clear records with 120 or 300 mm. cameras.
- ★ Paper speeds variable up to 6 metres or up to 12 metres a second.
- ★ Level frequency response up to 10 Kc/sec.

SEND FOR LIST 110/X. FOR FUTURE PUBLICATIONS ASK FOR MAILING FORM X/D/58

CAMBRIDGE INSTRUMENT CO. LTD.
13 Grosvenor Place, London, S.W.1

ELECTRICAL REVIEW

21 November 1958 Vol. 163 No. 21 Established 1872

Cleaning Up the Contracting Industry

NOBODY knows how many electrical contractors—genuine or so-called—there are in this country. It has been estimated, or guessed, that there are as many as 10,000. The position may become clearer as the work of the National Inspection Council for Electrical Installation Contracting progresses and becomes more generally known.

Registration of electrical contractors as a means of securing safe and sound installations has quite a long history now. The National Register of Electrical Installation Contractors was established in 1923 and there was acknowledgment of the work for the Register of the late Mr. P. V. Hunter and the still very active Mr. E. A. Mills at the annual meeting of the National Inspection Council last week. We would add a recollection of the part played by the late Mr. F. W. Purse.

The National Register paved the way but never made the necessary impact. It started with the blessing of all branches of the electrical industry but the early enthusiasm waned. The electricity supply authorities failed to give the support expected from them, but the *coup de grâce* was administered by the withdrawal from the Register of the Electrical Contractors' Association. The National Register never had sufficient funds either to make its inspection system effective (it had two or three inspectors for the whole country) or to secure the recognition of the public.

All the same it established an idea which did not die with it and the National Inspection Council thus had a foundation, however thin, on which to build. To succeed, the idea requires the co-operation of the electricity supply industry, the established electrical contractors and the consumers, as represented by many and varied organisations. The N.I.C. has secured the necessary support from within the industry and has succeeded in attracting the interest of many bodies representing the public. Above all, it has a better and more stable revenue, although there is a certain lopsidedness in the derivation of so much of its funds from the Electricity Boards.

In consequence it has been possible to institute a far better inspection system than the N.R.E.I.C. could ever afford. There is now an inspector for each of the Electricity Board areas and technical direction at headquarters. Since February, 1957, over 15,000 installations have been examined in 5,000 inspections of both approved contractors and applicants for enrolment. It is now possible to undertake routine inspections at the rate of 4,250 a year.

That is a picture of one side of the Council's activities: but enrolled contractors hope that their entry into the scheme will bring some reward in the shape of the elimination of the pseudo-contractor with his low prices for bad work. This can be achieved

only by securing the enrolment of all "good" contractors, so ensuring that all others dealing with the public are *ipso facto* labelled as unsatisfactory. This implies the "education" of the public, which can be quite expensive. But the cost should not be borne entirely by the Council's funds. All the organisations represented on the Board, and particularly the Electricity Boards and the contractors' organisations, must take their share in their own particular ways.

PUBLICITY SYMPOSIUM

When the British Electrical and Allied Manufacturers' Association instituted its annual Publicity Conference in 1956 it made a very useful move. To-day industries may almost be said to live by publicity, particularly when they are in competition with others in their own countries or overseas, which is invariably the case. Nowadays it is recognised that within an industry firms can be rivals and yet interchange ideas in certain spheres to their common advantage.

The B.E.A.M.A. Conference is a good example of this practice. The pooling of experience and thoughts on such matters as media and methods is calculated to raise the general standards of the electrical industry. This year some emphasis was put on the value of sound publicity in overseas countries by Dr. Charles Hill, who is responsible for the Government's information services, in his address at the luncheon which concluded the Conference.

BURIED TRANSFORMERS

One of the biggest problems which the electricity distribution engineer has had to face for a very long time is that of reinforcing the low voltage networks and distribution systems. This is largely because of the difficulty of establishing substations at strategic points or load centres on the system. About a year ago (*Electrical Review*, 6th December, 1957) we reported that, in conjunction with the South of Scotland Electricity Board, Ferranti, Ltd., had evolved a buried distribution transformer which offered a solution of this problem for it could be installed at any load centre without difficulty. Some notes on the operation of the transformer since its installation appear in this issue.

This innovation is much better than the more conventional method of reinforcing the networks by replacing existing transformers with larger ones, for this often means that the transformer is still rather remote from the load centre and much of the advantage is lost through increased voltage drop. Apart from the practical advantages indicated it is obvious that the buried transformer is economical—an important factor when funds for network reinforcement are limited.

WELDING PRODUCTION

Electric welding—both arc and resistance—has made a great contribution to increasing production in the past decade or two, but of late we have wondered if the ever-increasing multiplicity of welding machines which have appeared on the market have not tended to retard the rate of acceleration of the full effects of welding production. Because of this we welcome the presidential address of Mr. J. Strong of the Institute of Welding recently which we briefly report in this issue.

Mr. Strong pointed to the very wide range of arc welding processes now available to industry and called for an amalgamation of some, or all, of the processes in the interests of increasing production. We, too, believe that if the number of processes were reduced considerably it would permit further rationalisation of automatic welding design and therefore do much to increase the output of the production flow line embracing welding processes.

COMPUTER MANUFACTURE

We are all painfully aware how easy it is to make an arithmetical error in a long calculation and of the amount of effort required to trace the fault. In this respect, a computer is very much like its human counterpart; the cause of the error may be a great deal harder to trace even though the calculations are arranged to be self-checking.

There are two ways of reducing the possibility of errors occurring in the operations of a computer, firstly by stringent quality control during manufacture and secondly by planned maintenance after installation. The maintenance programme of a computer includes a daily 30-minute test programme run outside the normal optimum operating conditions so that incipient faults can be detected. Last week we visited the works where the DEUCE computer is manufactured and found that quality control was a very important feature. The other products of these works are mainly in the automatic control field for it is the policy of the English Electric Co. to concentrate computers and automatic control devices in one department in readiness for the development of processes involving computers as the "brains" of completely automatic control systems.

SHORTER WORKING WEEK

When the Confederation of Shipbuilding and Engineering Unions first put forward its claim for the institution of a forty-hour week in the engineering industry it was regarded as the natural outcome of improved production methods, requiring less labour. At that time, however, considerable overtime was being worked in the industry which made the claim seem inopportune. The proposal was rejected by the employers, as was a modified one by which the reduction to forty hours would be made in three stages up to 1960.

Since the claim was originally advanced conditions in the engineering industry have eased and there have been many cases of short-time working. This strengthens the unions' case but, it is to be hoped, only temporarily. If a reduction of "official" hours was to lead later to excessive overtime at higher rates there would be serious additions to the industry's costs. The unions have now approached the Minister of Labour with a view to the submission of the matter to the Industrial Disputes Tribunal. If this is done the dispute will be one of the last of the Tribunal's cases for it is to be abolished on 1st March next and no more questions can be referred to it after 10th December.

World's Largest Boiler

DESIGN PROGRESS BY INTERNATIONAL COMBUSTION

Thorpe Marsh generating station, which is to be built for the Central Electricity Generating Board on a site near Doncaster, will ultimately accommodate two 550 MW turbo-alternator/boiler units. The boilers will each have an evaporative capacity of 3,750,000 lb/hr and will be the largest single units in the world. The design work on the first one is now in an advanced stage and last week the contractors, International Combustion, Ltd., released details of the main features of the unit

EARLIER this year the Central Electricity Generating Board placed an order with International Combustion, Ltd., for a 550 MW reheat boiler for installation in the projected Thorpe Marsh generating station near Doncaster (see *Electrical Review*, 14th February, 1958). It is probable that this station will ultimately accommodate two turbo-alternator/boiler units and have a total installed capacity of 1,100 MW.

Thorpe Marsh will cost something in the region of £40 million (roughly £6 million for each boiler unit) and will require more than 2½ million tons of coal a year. Because of this very high rate of fuel consumption coal will be drawn from a wide area covering the Yorkshire coalfield and the northern parts of the Nottinghamshire coalfield. The quality of the fuel is likely to vary over a wide range with calorific values from 8,300 to 12,000 B.Th.U./lb, with ash contents from 6 per cent to 30 per cent (or even up to 40 per cent in some instances), and moisture from 4 per cent to 20 per cent. Special steps have been taken in designing the boiler to enable it to accept coal with this wide range of characteristics. The hourly coal consumption of each boiler will be between 205 tons and 220 tons depending upon the quality of the coal being used at the time.

The boiler unit is designed to have a maximum continuous evaporative capacity of 3,750,000 lb/hr at 2,400 p.s.i. and 1,055 deg F. As has become customary with large units in recent years, the steam, after passing through the high-pressure turbine, will be returned to the boiler for reheating to the original temperature of 1,055 deg F. The feed water will enter the boiler at a pressure of about 2,600 p.s.i. and a temperature of 496 deg F at full load. Based on the gross calorific value of the fuel the boiler has been designed to have an efficiency of 90 per cent.

So far as is known, the Thorpe Marsh boiler is the largest single steam generating unit at present under construction anywhere in the world and it is likely to remain so for some time to come. International Combustion, Ltd., submitted a twin furnace controlled circulation design for the single reheat boiler unit for this large evaporation, because this type of unit is capable of satisfactory operation over protracted periods, burning fuels with a wide range of moisture and ash content, together with a relatively low ash fusion temperature. Development work has progressed satisfactorily following the decision to proceed with this design and last week the company released details of the main features of the boiler, where the design work has reached an advanced stage.

Circulating System

The adoption of controlled and assisted circulation follows logically on other current designs in which the natural circulation potential, due to the thermal head, is augmented by a pumping system. This system permits smaller bore tubes to be used for both risers and downcomers, and the consequent use of a thinner wall and the reduced temperature gradient across it enables safety of operation and economy of capital cost to be achieved simultaneously.

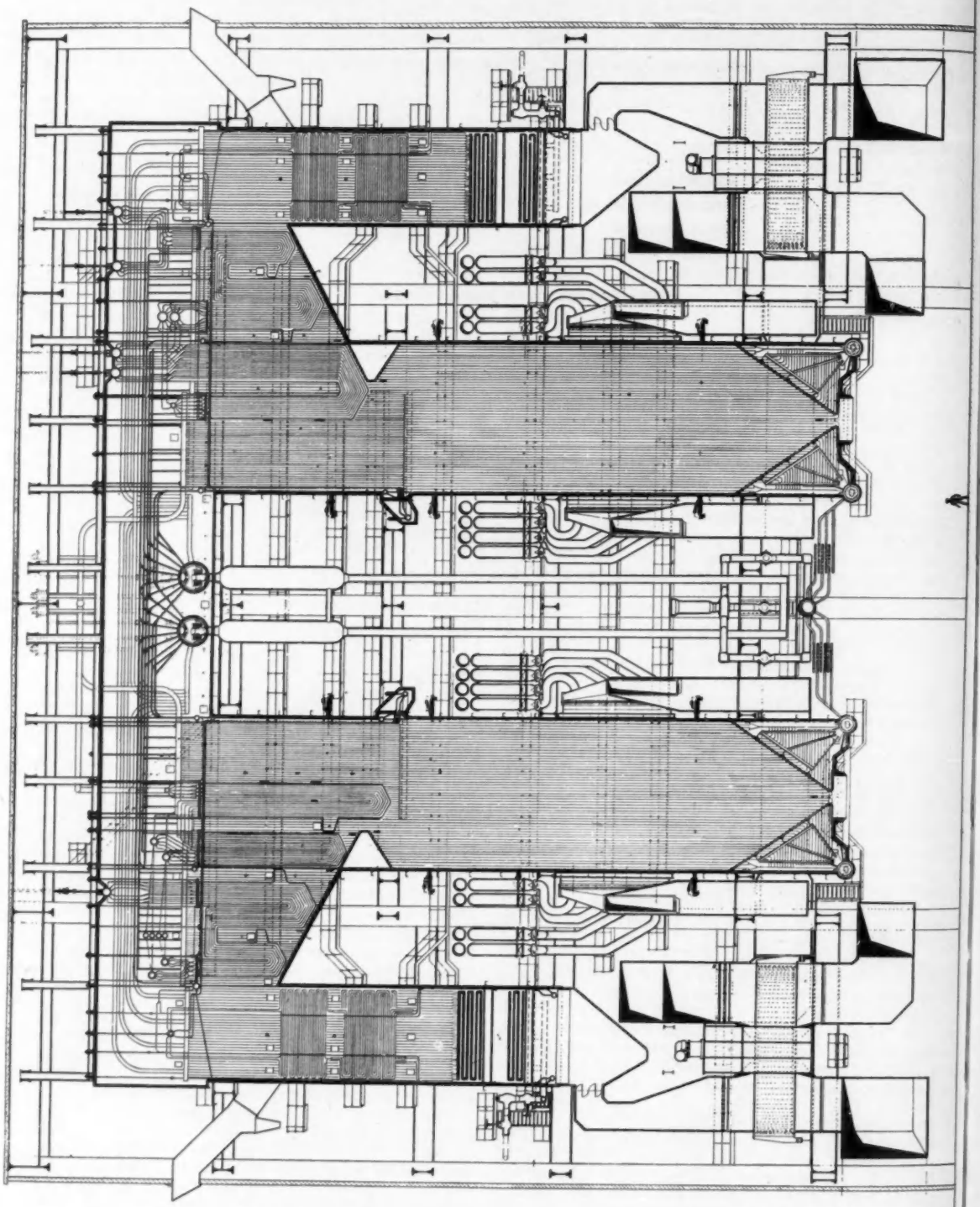
The water supplied to each evaporating circuit is matched to the calculated heat absorption of each individual circuit by control nozzles. These nozzles improve circulating stability of the circuit, so that wide fluctuations of heat absorption do not result in overheating of the tube metal by reason of variable external fouling of the heating surface.

Although the boiler is divided into two separately cased twin furnace units, each sub-divided by a partition wall and provided with two steam release drums, the unit forms one single entity with both drums connected into the circulating system of the furnace so that the system operates as a unified and balanced unit with a single water level control.

The water from each drum is extracted by equal downcomer legs to centrally positioned circulating pumps, in turn discharging to a common manifold. From here multiple feeder tubes supply both furnaces whilst the risers forming the furnace walls discharge equally to both drums. The steam output from both furnaces is, therefore, equally distributed to both drums. Feed water is also equally divided and ample cross-over pipes below the normal water level balance the water flow equally between the two drums. Equal steam withdrawal from both drums is ensured by taking half the steam to each of the primary superheater headers.

This simple unified system ensures that any one circulating pump will operate satisfactorily and feed both furnaces equally and simultaneously. With this arrangement, biased firing will not disturb the water levels or the steam pressure, a particular advantage during steam raising periods.

Six circulating pumps will be installed, five of which



Sectional elevation of the Thorpe Marsh 550 MW reheat boiler

will maintain the design circulation rate at maximum continuous rating. Indeed, it is anticipated that four pumps will be adequate for this purpose, while a corresponding number will be sufficient for lighter loads. These pumps are built integrally with the downcomer system and the design eliminates differential expansion and consequent complication of piping. Fully automatic sequence control will be incorporated for starting the pumps in the event of failure.

The pumps themselves are of vertical spindle, single-stage, centrifugal design, and each is driven by a 500 h.p. squirrel-cage induction motor whose windings are immersed in the circulating water. The motor casing is built to withstand the full operating pressure of the system; the windings are of a special design capable of withstanding the pressure; and an external cooling system is mounted to ensure a satisfactory temperature level.

After separation in the drums the steam passes through turbo-separators and scrubbers to the superheater, whilst the water at saturation temperature passes around the drums before returning to the circulating pumps. This ensures that the whole of the drum interior surface is maintained at a uniform temperature, a very great advantage during a quick start.

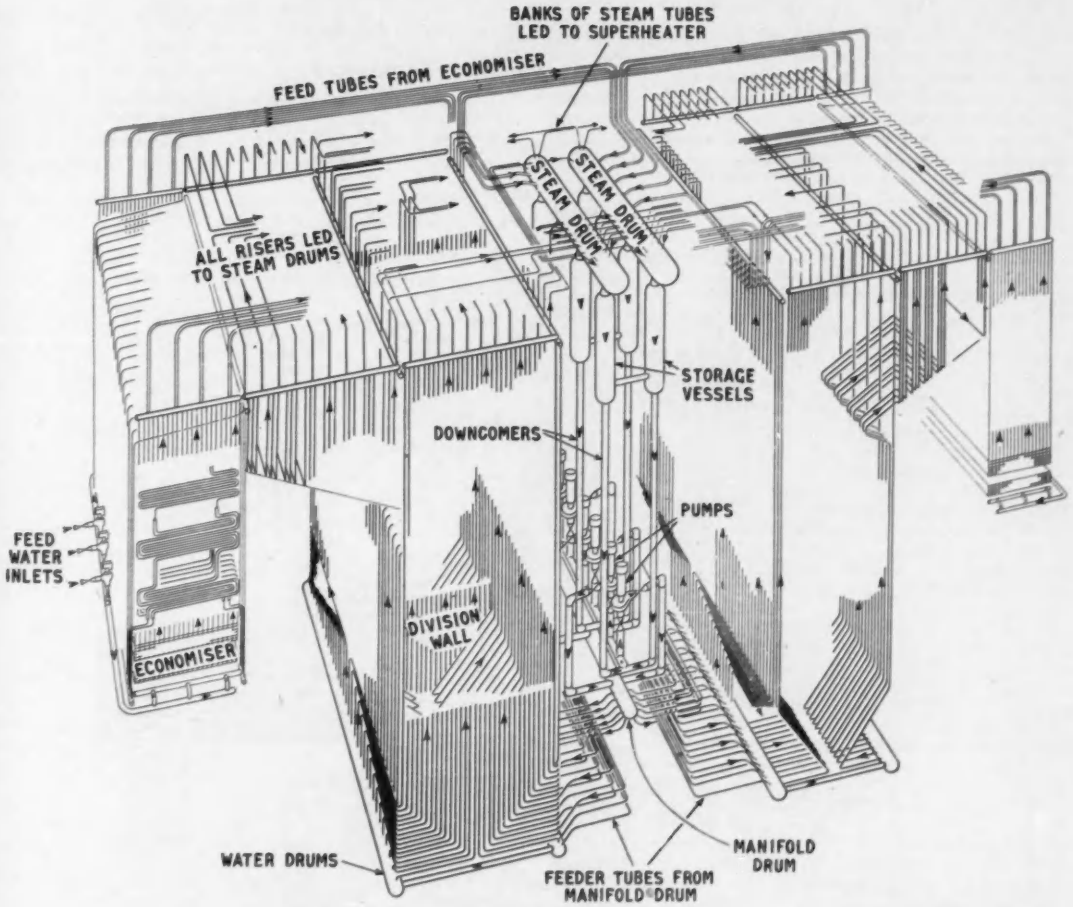
In accordance with current practice the heating surfaces of the superheater have been arranged in such a way that the maximum effective use of inexpensive carbon and low alloy steels has been obtained, thus reducing to the minimum the use of costly austenitic materials. The final stage of both the superheater and reheater is located away from the hottest zone at the top of the furnaces. In the highest gas temperature zone platen superheaters are used consisting of a number of superheater tubes welded together to form a flat plate. The platens, spaced widely apart, are largely self-cleaning and will operate for lengthy periods without " off-load " cleaning, even when burning low ash fusion coals.

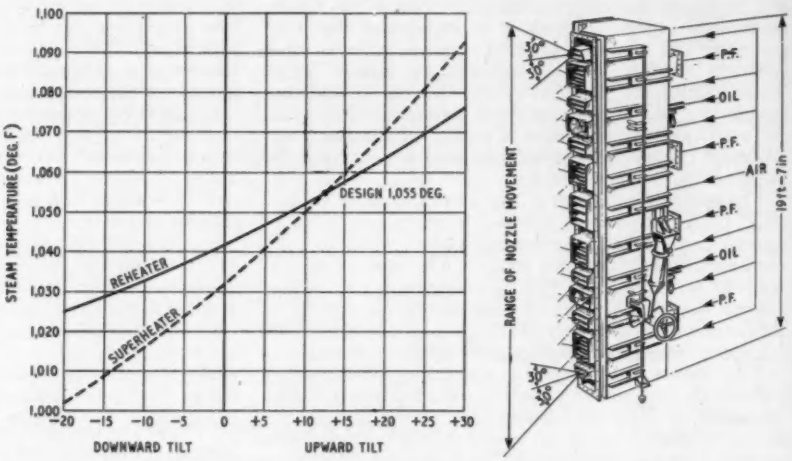
An adequate system of cross-over tubes is incorporated in the superheater arrangement so that there is automatic compensation for any inequality of heat absorption. Radiant superheater surface is installed in the top of the furnace; this not only permits the maximum economy of convection surface but considerably improves the steam temperature control characteristic. The superheater has been designed in collaboration with and is being supplied by the Superheater Co., Ltd.

Steam Temperature Control

With the advance in steam and reheat temperature the importance of close temperature control cannot be overemphasised, not only for the sake of the turbine efficiency, but also to keep the metals of the boiler itself, the steam

Circulation diagram for International Combustion 550 MW reheat boiler





Arrangement of tilting pulverised fuel burner. The graph shows estimated burner tilt and steam temperature characteristic at maximum continuous rating

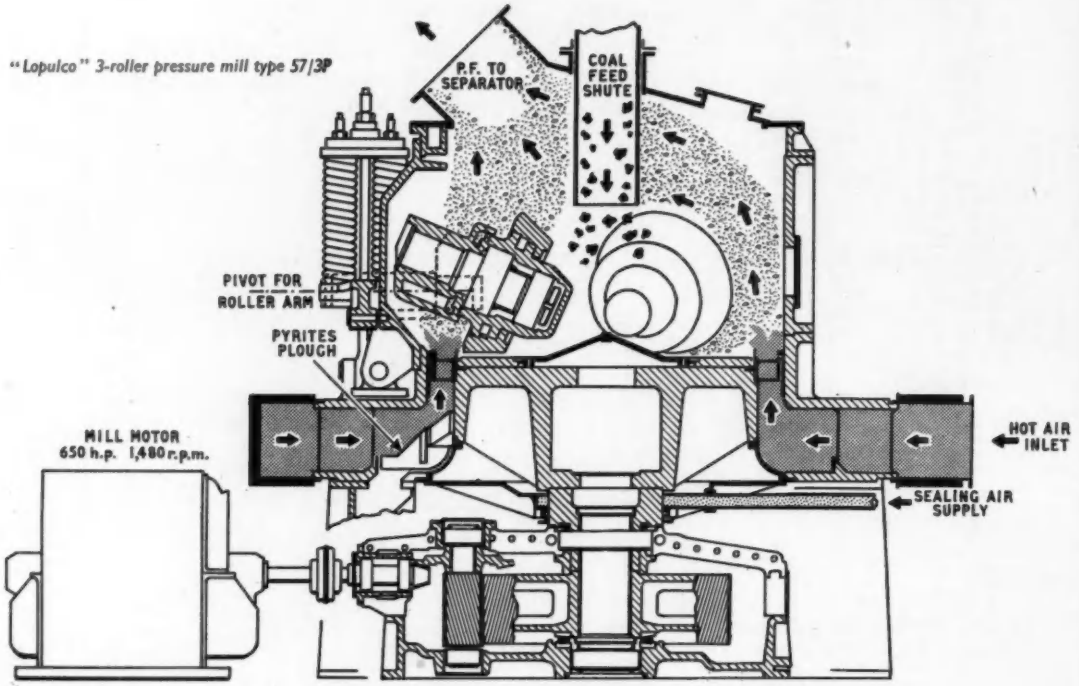
piping, and turbine blades, within safe operating limits. Spray-type desuperheaters are installed for emergency use, but the primary steam temperature control is obtained by tilting burners on both the superheater and reheater furnaces. For this purpose a burner assembly is installed in the four corners of each sub-divided furnace.

Each corner burner assembly consists of four coal nozzles and secondary air nozzles, arranged to discharge tangentially to an imaginary cricle in the centre of the furnace to form a vortex. These are adjusted automatically in a vertical plane between an angle of +30 deg and −30 deg to the horizontal, so that the flame mass is projected into any desired position within the furnace between these limits. This has the effect of varying the furnace exit temperature and consequently the superheat and the reheat temperatures. It is anticipated that constant temperature will be maintained within ±10 deg F over a range of 70 to 100 per cent of the maximum continuous rating.

Experience has shown that this system of steam temperature control, developed over a number of years, responds rapidly to any change in operating condition and, even with the large furnace, penetration of the jets to the centre of the furnace and the resultant turbulence of the gases, ensures a high standard of combustion efficiency. Progressively increased in size, each of the present coal nozzles is capable of handling approximately six tons of coal per hour with an associated air quantity of 60 tons/hr.

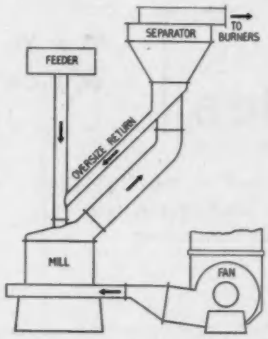
Milling Equipment

The coal pulverising mills have been specially developed for the large quantities involved (over 200 tons/hr for each boiler) and will individually be substantially larger than any others at present in commercial operation for



"Lopulco" 3-roller pressure mill type 57/3P

Diagrammatic arrangement of milling plant



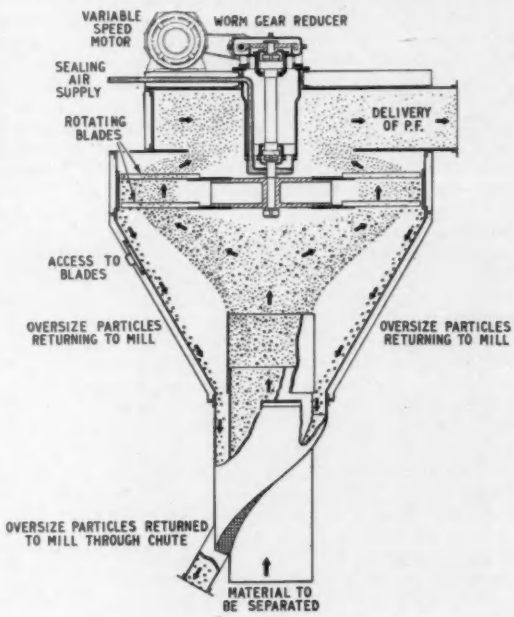
coal burning. Eight "Lopulco" three-roller mills will be installed, each capable of handling over 50 tons of coal per hour, but six will normally be in operation, allowing two to act as standby for maintenance.

Each mill is capable of handling coal with a moisture content up to 28 per cent, using hot air at 550 deg F for drying the fuel. The mill will have a centre feed enabling the outlets to be suitably positioned and thus provide a vertical straight-through feed to the mill itself without bends to restrict the flow of wet and sticky coal. To achieve this the classifier has been placed separately from the mill but near to it. The over-size, hot, dry rejects from this are re-delivered to the centre main feed chute, mixing with the incoming wet fuel and thus assisting both in movement down the chute and drying within the mill itself. Pyrites and tramp iron are extracted from the mill in a manner similar to that employed on other standard "Lopulco" mills.

The fuel discharged from each mill is equally distributed to each half of the furnace and the output of each mill discharges to a single tier of burners, but the firing rate can be biased in favour of one or other of the furnaces if required. Each mill is driven by a 650 b.h.p., 1,480 r.p.m. motor. Lubrication of the gearbox is by pump, while the roller arm is by drip feed at a suitably controlled pressure to assure adequate, but not excessive, lubrication.

The boiler will have four rotary air heaters and a total of eight i.d. and f.d. fans. The four f.d. fans will be driven by 865 h.p. motors while the i.d. fans will be driven by 1,570 h.p. machines. The latest designs of mechanical and electrostatic dust precipitation plant will be installed to clean the flue gases, at a cost which represents something in excess of 10 per cent of the cost of the boiler plant as a whole.

Thorpe Marsh double whizzer separator (13ft diameter)



Electro-Heat Exhibition

DURING last week an Electro-Heat and Productivity Exhibition, organised by the South of Scotland Electricity Board, was held at Kelvin Hall, Glasgow, at which a large number of leading manufacturers of electro-heat equipment took part. Sir John Pickles, chairman of the South of Scotland Electricity Board, presided at the opening ceremony, which was performed by Mr. J. S. Maclay, Secretary of State for Scotland.

In declaring the exhibition open, Mr. Maclay said that the use of electricity had always been recognised as one of the best ways of increasing productivity because it was one of the simplest means of putting more power into the hands of the worker. American productivity was higher than that of the United Kingdom, but each American worker had at his elbow three times as much electrical power as his counterpart in this country. The exhibition should help to put things right in Scotland.

Sir John Pickles said there was a vast field ahead for the use of electricity in industry, for heavy industries down to a small baking and confectionery business. Speaking of the growing demand for electricity, Sir John said it was just as much as his Board could do each year to install the additional plant and services required. They wanted industry to use more electricity and to use it more efficiently. The primary object of the exhibition was to make known to industrialists the many new electro-heating appliances that were now available.

A conference was held in conjunction with the exhibition at which the following papers were presented:—"Higher Productivity with the Aid of Radioactive Isotopes," by Mr. W. G. Busbridge, M.A. (Isotope Division, Atomic Energy Research Establishment, Harwell); "Use of Electric Resistance Welding Machines for Rapid Fabrication in the Light Engineering Industries," by Mr. R. W. Ayers, M.Inst.W. (Sciaky Electric Welding Machines, Ltd.); "Fabrication by Electric Welding in the Heavy Engineering Industries," by Mr. R. W. Watts (Metropolitan-Vickers Electrical Co., Ltd.); "Electric Space Heating, Water Heating and Steam Raising in Industry": (1) "Hot Water and Steam Systems," by Mr. J. Jamieson, B.Sc., M.I.E.E., M.I.Mech.E., M.I.H.V.E. (Bastian & Allen, Ltd.), and (2) "Direct Electric Space Heating Systems," by Mr. W. M. Stevenson, Associate I.E.E. (South of Scotland Electricity Board); "Electric Ovens and Furnaces for Industrial Process Heating and Heat Treatments," by Mr. M. O'C. Horgan, O.B.E., M.Sc., M.I.E.E. (General Electric Co., Ltd.); "Electric Melting, Smelting and Alloying of Metals," by Messrs. A. G. E. Robbiette, D.Sc., F.I.M. (consulting metallurgist, Birlec, Ltd.), and F. S. Leigh, B.Sc., M.I.E.E. (manager, Metal Furnace Division, Birlec, Ltd.); "High Frequency Electricity in the Rapid Heating and Joining of Metal, Wood and Plastics and in the Manufacture of Foods," by Mr. C. E. Tibbs, M.I.E.E., M.I.Brit.R.E. (Radio Heaters, Ltd.); "Direct Electric Heating for Industrial Fluids, Vessels and Pipelines": (1) "Using Electricity Induced in the Walls of Vessels and Pipelines," by Mr. M. G. Gibbs, Associate I.E.E. (Wild-Barfield Electric Furnaces, Ltd.); (2) "Using Flexible Insulated Elements on Surfaces of Vessels and Pipelines," by Mr. T. A. York (Stabilag Co., Ltd.); and (3) "Using Metal Sheathed Elements Immersed in the Fluids," by Mr. H. S. Carter (Metropolitan-Vickers Electrical Co., Ltd.).

The conference concluded with a general résumé by Mr. R. McGlashen, A.M.I.E.E. (South of Scotland Electricity Board), chairman of the Lanarkshire Productivity Committee.

Electrification of U.K.A.E.A. Factories

By J. W. BINNS, M.I.E.E., and W. J. OUTRAM, M.Eng., M.I.E.E.

Authors' summary of a paper which was presented to the Utilisation Section of the Institution of Electrical Engineers (in conjunction with the British Nuclear Energy Conference) on 13th November

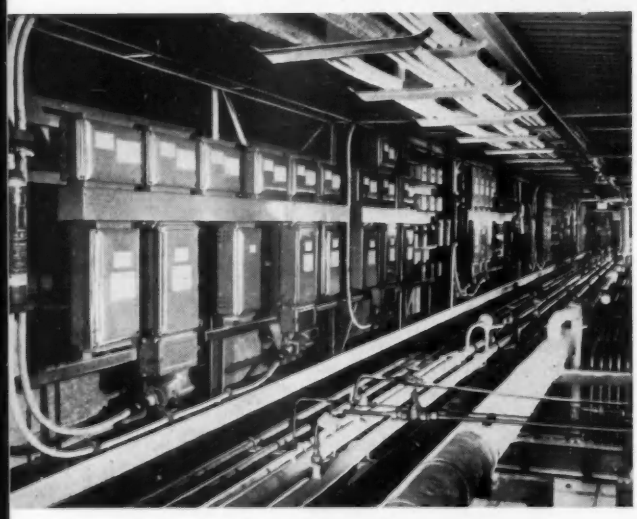
THE whole of the design work for the projects under the control of the Industrial Group of the United Kingdom Atomic Energy Authority is centred at Risley, near Warrington, the electrical work being the responsibility of the Electrical Design Office. The work of the Electrical Design Office has grown at such a rate that the staff has had to be increased some fifteen-fold in the course of the last 11-12 years.

To meet the early nuclear project requirements, use was made of existing Ministry of Supply factories; in fact, for the original fuel element plant at Springfields, near Preston, existing buildings and services had to be adapted for processing the uranium ore right through to the finished uranium rods. This adaptation of existing buildings and services created problems of its own as well as those associated with meeting the electrical requirements for relatively new processes.

More recent plants and extensions to existing plants have been purpose-designed for the processes involved; this has enabled special provision to be made for the electrical services. This applies especially to those processes involving dilute acids, solvents and the handling of active materials necessitating the plant operators going through a change procedure. In these cases the design has enabled the major electrical distribution and control to be situated outside the main process area. This has been achieved by the creation of service corridors and in some instances these corridors have been constructed in the roof spaces. A typical example is illustrated in Fig. 1.

In addition to the plant at Springfields, chemical plants have also been built at Windscale and Dounreay, the former for the separation of plutonium from irradiated fuel elements, and the latter for the handling of enriched fuels required for the more advanced types of reactors. All of these have brought their own special problems, some of which are described in the paper.

Fig. 1.—Electrical services corridor



A typical example of the growth of the electrical demand in these factories is illustrated in Fig. 2 which shows recent development of the Springfields main supplies. The original main intake of this factory consisted of duplicate 7·5 MVA, 33/6·6 kV transformers, each feeding a 6·6 kV ring main. The initial requirements for recent uranium plant extensions indicated that the addition of an existing third 7·5 MVA, 33/6·6 kV transformer, reactor coupled to the existing infeeds, and an additional 6·6 kV ring main, should meet the demand for some years. In view, however, of the continual change in requirements, it was thought prudent to order h.v. switchgear for the new plant suitable for both 6·6 and 11 kV working, to install 11 kV cabling and, at what appeared to us a very reasonable extra cost, medium-voltage transformers (1,000 kVA) suitable for either 6·6 or 11 kV. Full justification for the relatively small extra cost of all these has already been proved, as considerable extra loads have now arisen necessitating the installation of two 20 MVA, 33/11 kV transformers for the new plant and the uprating of distribution to this plant to 11 kV, this being shown on the right-hand side of the diagram.

As well as chemical plants, the Electrical Design Office at Risley has been responsible for all the electrical equipment associated with the original Windscale piles, the Calder Hall power station, and the fast reactor at Dounreay.

Whilst no effort has been made to enlarge on the Calder Hall "electrics," as these are being fully dealt with in a separate I.E.E. paper to be presented on 15th January, 1959, by Messrs. Mackay and Hardwick, some of the problems associated with the Windscale pile and the Dounreay fast reactor are described.

Rather special arrangements have been made to ensure the supplies to the coolant circuit for the Dounreay fast reactor. Here, in view of the high heat rate of the reactor and of the difficulty of ensuring a truly reliable external supply to the remote Dounreay site, use has been made of diesel units. The main coolant circuit of this reactor is in twelve independent circuits, each of which is fed by a unit diesel generator, all twelve circuits being normally maintained as isolated electrical groups. Six similar sets are also provided for standby duty and can be switched to take the place of any of the twelve normal sets. Each of these sets is rated at 120 kW and is of package design. In addition, a further six 220 kW sets are provided for the essential reactor supplies not directly associated with the coolant circuits and these are connected to a common busbar.

The importance of emergency supplies for reactors is

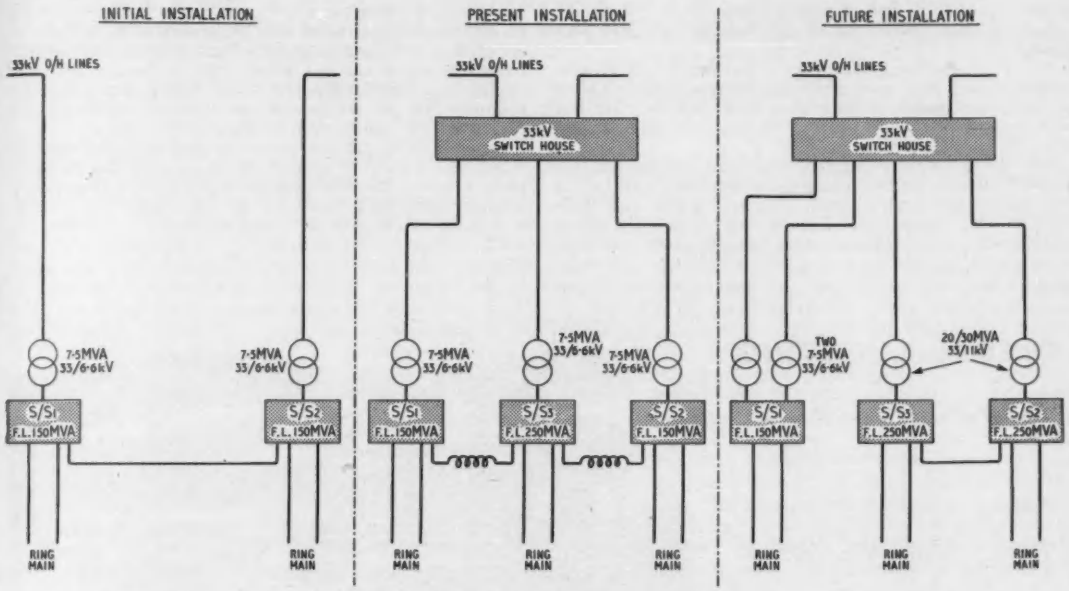


Fig. 2.—Diagram of development at Springfields

emphasised and the development of this special service since the original Windscale pile is described. The basic problem is to provide a continuous supply without any interruption whatsoever, even in the event of complete supply failure. Some idea of the magnitude of this problem will be gathered when it is realised that the emergency load of a station such as Calder Hall is approaching 500 kW.

The paper also touches on some of the special problems associated with the diffusion plant at Capenhurst which has a maximum demand of some hundreds of MW at a load factor of 0·98, and consists essentially of hundreds of continuously running induction motors, ranging in size from a few hundred h.p. to quite small drive units. It is probably the greatest concentrated single load in Europe.

The power requirements for this diffusion plant are obtained from four 132 kV grid substations, each supplied by two independent overhead lines. Two of these grid substations each connect via three 132/11 kV transformer feeders to 11 kV plant substations, and they contain over sixty 500 MVA, 11 kV circuit-breakers. Two other grid substations each connect via fifteen 10 MVA, 132/3·3 kV transformers, arranged on five 132 kV cable feeders, to 3·3 kV plant substations. A view along one of the 3·3 kV substations is shown in Fig. 3.

Fig. 3.—View along 3·3 kV substation at Capenhurst

Discussion

The discussion on the above paper was opened by Mr. D. B. Hogg (I.C.I.), who said it would have been impossible for the things described in the paper to have been done had there not been in the background in this country a very large heavy chemical industry which had been going for many years. The real background was research, of which more was done in the heavy chemical industry than in any other single unit outside Government circles.

Mr. W. Fordham-Cooper (Ministry of Labour and National Service) hoped that there would be a paper on installation control. He agreed with the principle of ensuring reliability by the greatest possible simplicity. The more clever a thing the more likely it was to go wrong. Another important point was that during maintenance work in dangerous situations the person in charge of complicated work should not be the person in charge of safety and vice versa. The two functions should be quite separate.

Mr. H. Leyburn (Reyrolle) remarked that the theme recurring throughout the paper was reliability and continuity of supply. The two main problems seemed to be on the one hand a load so large that the provision of local standby plant was out of the question, and on the other hand the need to provide for a large number of comparatively small essential auxiliaries where the load they represented was relatively small. The avoidance of instability was a question which affected a number of undertakings and he was glad to see there was to be a paper dealing with the problem.

Mr. P. S. K. Eaves (C.E.G.B.) said that the unusual feature of the problem at Capenhurst was the large mass of concentrated induction motor load in relation to the generating capacity in the area. He described the steps taken to cope with the problem.

Mr. J. Tozer (Kennedy & Donkin) supported the authors' contention that adequate provision should be made for cables. Electrical engineers should be brought in, he said,

at the outset of a project so that they could reserve the space required for their cables and hang on to it like grim death.

Mr. D. J. E. Evans (Kennedy & Donkin) observed that several papers had been published in American literature on induction motors in network analyser studies. He was very pleased that there were to be similar studies in this country.

Mr. J. Solomon (C.E.G.B.) expressed interest in the authors' remarks on switchgear for power station auxiliaries and standardisation. Supply practice might not tally entirely with the authors' practice, but there were points of common interest, some of which he outlined.

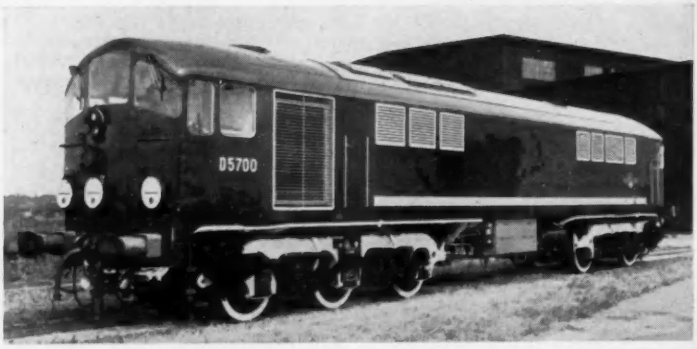
Mr. W. F. Foster said there was no code of practice for chemical plants, such as the National Electrical Code of America or the Institute of Petroleum electrical code, which related to oil refineries. These codes defined a source of hazard as, indeed, did the Coal Mines Act. Another anomally was the absence of any statement as to whether flameproof equipment must be Buxton certified.

Mr. J. C. Williams commented that one important question which did not seem to have been covered was lightning protection and it would be interesting to know what special arrangements were necessary in this respect on sealed containing buildings of the Dounreay type.

The authors briefly replied.

DIESEL-ELECTRIC LOCOMOTIVES

Twenty 1,200 H.P. Mixed-Traffic Units for British Railways



The first of twenty 1,200 h.p. mixed-traffic diesel-electric locomotives ordered by British Railways

LAST week we were present on a demonstration run of one of twenty 1,200 h.p. mixed-traffic diesel-electric locomotives which have been ordered from the Metropolitan-Vickers Electrical Co., Ltd., by the British Transport Commission as part of the large-scale modernisation plan for British Railways. These locomotives are fitted with Crossley HSTVee.8 two-stroke engines, and the mechanical parts are being made by Metropolitan-Vickers-Beyer, Peacock, Ltd., Stockton-on-Tees. The electrical equipment is being made by Metropolitan-Vickers at Manchester and Sheffield. All twenty locomotives are being allocated to Derby and will handle mixed traffic over a wide area of the Midland Division of the London Midland Region.

The design and construction of the locomotives are to the requirements of the B.T.C. under the general direction of Messrs. R. C. Bond and S. B. Warder (formerly chief mechanical engineer and chief electrical engineer, respectively, of the British Railways Central Staff, B.T.C.) and in collaboration with Mr. J. F. Harrison, formerly chief mechanical and electrical engineer, Derby, London Midland Region.

The locomotives have full-width bodies with driving cabs at each end and are of the Co-Bo type. There is a driving position on the left-hand side of each cab, and up to three locomotives can be driven in multiple. Multiple-unit operation of these locomotives with others now being delivered under the modernisation scheme and fitted with electrical equipment made by the General Electric Co., Ltd., and Brush Traction, Ltd., has been arranged by co-operation between the three companies, and will undoubtedly prove a valuable asset to the operating staff. Some of the principal technical particulars are as follows:—

Total weight in working order	97 tons
Length overall	56ft 7½in
Wheel diameter	39½in
Diesel engine continuously rated h.p.	1,200 h.p. at 625 r.p.m.
Maximum tractive effort ...	50,000 lb
Continuous tractive effort	25,000 lb at 13·5 m.p.h.
Maximum service speed ...	75 m.p.h.
Fuel oil capacity (engine and boiler)	510 gallons

As will be seen, the maximum tractive effort is 50,000 lb, and the continuous tractive effort is 25,000 lb. It is these basic requirements that have led to the adoption of the five axle, five motor design. On notch 10 full power is available between 4·3 and 61 m.p.h., this range being covered by control of generator excitation up to about 25 m.p.h. and by traction motor field weakening thereafter, and the equipment is within the continuous rating at all speeds from 13·5 m.p.h. to the maximum speed of 75 m.p.h. At speeds below the full power range the tractive effort is automatically limited to the maximum by a current limit relay, while above the range the tractive effort decreases in accordance with the inherent characteristic of the motor at sensibly constant voltage. Some indication of the hauling capability that these figures imply can be obtained from the fact that, on test runs before delivery, each single locomotive starts and accelerates to about 10 m.p.h. a 420-ton train (13 or 14 bogie vehicles) on a gradient of 1 in 42; the balancing speed on the level with this weight of train is 60 m.p.h.

I.E.C. Recommendations

FIRST editions of two sets of recommendations have recently been issued by the Bureau de la Commission Electrotechnique Internationale, 1, rue de Varembé, Geneva. One of these, No. 100 (10 Swiss francs plus postage), deals with methods of measuring direct inter-electrode capacitances of electronic tubes and valves. Items relate to receiving tubes and valves, cathode-ray tubes, gas tubes and gas-filled valves, photo tubes, photo cells and multiplier types, high-power vacuum tubes and valves. Five tables describe electrode connections, and detailed specifications are given for relevant standard sockets, shields and cap connectors to be used in measuring and testing.

The other publication, No. 105 (1·5 Swiss francs), prescribes the electrical properties of commercial-purity aluminium busbars of any cross-section measured between 10 and 30 deg C and corrected to 20 deg C.

NATIONALISATION SURVEYED

Has It Succeeded? Will It Extend?

IN his younger days Mr. R. Kelf-Cohen was an ardent advocate of nationalisation. Later, as an Under Secretary of the Ministry of Fuel and Power he was concerned with the administration of nationalised industries and gained experience of their operation. Now that he has retired from the Civil Service he has published his findings.* We can say at once that those findings are, on the whole, not favourable to the system which has been built up in this country, but not inimical to the continuance under national ownership of the industries already nationalised.

The author deals with the coal, transport, electricity, gas, and iron and steel industries which were all hurriedly taken over by the Labour Governments of 1948-51 in pursuance of the "dogma" referred to in the book's sub-title. It is suggested that, while some justification for public ownership might have existed in the case of the first four, the case for the nationalisation of the iron and steel industry was extremely poor.

When he comes to deal with the financing of nationalised industries Mr. Kelf-Cohen is faced with vastly different circumstances in the five industries and he naturally finds it difficult to treat them on a common footing. As a consequence he seems to regard the forward-looking policy of the electricity supply industry as wasteful of the nation's resources. He complains that there has been no "nation-wide" policy to improve load factor and thereby reduce the need for generating plant. But any significant load factor improvement can come only from the consumers, mainly the industrial consumers. Such "incentives" as the supply industry can provide are unlikely to make a substantial difference, although the attempt is being made.

Mr. Kelf-Cohen considers that in the matter of Treasury advances the industry has been too well treated and he advocates that it should be compelled to go to the financial market for its money.

In his study of the members of the Boards of nationalised undertakings the author is unfairly critical of the original top administration of the electricity supply industry. He also condemns the tendency to appoint senior staff to the Area Boards. He seems to think that this move towards "technocracy" could be countered by appointing "strong" part-time chairmen and deputy chairmen from the outside world who would control high policy while still maintaining their existing contacts.

Linked with this is the very great amount of patronage which the present system places in the hands of Ministers and the "life or death" powers which they thus possess. On the broader question of relationships between the Government and the nationalised industries the author visualises a continuing conflict between the desire of the former to "tighten the financial reins" while the "technocrats who man the Boards" wish "to maximise development in their own sphere." He believes that this will result in a decline in the quality of Board members.

The reactionary policy of the Boards in the matter of staff promotion is reflected on and the Herbert Committee's view that there should be more careful selection of men regardless of seniority is tacitly approved. As regards the "workers" Mr. Kelf-Cohen suggests, rather naïvely, that as they have gained much from nationalisation they should face up to their responsibilities to the nation.

But what of the public—the "consumers" of the goods and services of the nationalised industries? The author says that nationalisation was not intended primarily to benefit the consumers but "to rescue the workers from exploitation by the Capitalist." They would no longer provide profits for the capitalist and they would receive better service. But, says Mr. Kelf-Cohen, in spite of the work of consumers' councils the public finds itself subjected to official coldness and are at a loss to understand the Boards' policies and activities. It seems that public relations are lacking in many ways and this is reflected in the industries' annual reports which ignore "the concept that a state-owned industry is there to render a service to the Nation who own the industry and consume its products." Mr. Kelf-Cohen is rather sweeping here. While the Boards may be remote from the public much good work is done locally, in the electricity supply industry at least.

In a chapter on "Future Labour Policy on Public Ownership" the impression is conveyed that there has lately been some soft-pedalling, an attitude forced on the Party by doubts about the alleged benefits of nationalisation and by the existence of more enlightened "capitalists." It is the Labour Party's intention to go ahead with its ideas vaguely modified though they may be.

In summing up, Mr. Kelf-Cohen says it is agreed on all sides that nationalisation cannot be reversed, but that does not mean that Governments must automatically support the Boards. A more definite and deliberate policy should be adopted towards them. In fact, Mr. Kelf-Cohen wants general direction by the Government to be used as an instrument of national policy. For instance, he proposes that the Minister of Power should direct the Area Electricity Boards to take every possible step to improve their load factor, including tariffs designed to that end. Although, of course, the Boards are already doing something about it there is scope for more action but, as we have said, they are largely in the hands of the consumers. But the Minister can hardly tell consumers when and how to use electricity.

For our part we dread the possible results of further Government pressure upon our particular industry however much it would please the Civil Service.

Our review of this book may seem to be hypercritical, but this is because of its controversial nature. It is a book which all concerned with the welfare and the future of our industry should read.

F.B.I.'s Views

Nationalisation is looked at from another point of view in a booklet just issued by the Federation of British Industries (21, Tothill Street, London, S.W.1.—5s). Its purpose is frankly stated in the opening paragraph which says:—

> "This report reviews the arguments advanced for further measures of nationalisation or state ownership of industry; analyses the effects of such measures upon industry; and gives reasons for the conclusion that they are not only unjustified but would bring positive harm to the country's economy."

It is admitted that there are exceptional cases where

---

* *Nationalisation in Britain: The End of a Dogma.* By R. Kelf-Cohen, C.B., M.A., B.Sc.(Econ.). (310 pp.). Macmillan & Co., Ltd., St. Martin's Street, London, W.C.2. Price 25s.

some measure of public ownership or control may have been a reasonable choice, but these are few in number and do not bear out the claims for the general superiority of public over private ownership.

On the contrary, "free enterprise" has shown itself to be capable of providing high and rising standards of living and is made more efficient from being subject to competition. No case is made out for the de-nationalisation of those industries and services which have already been nationalised as the impracticability of doing this (against the desirability) is realised. But the report is concerned with threats of further nationalisation, particularly of the steel and long-distance haulage industries.

The arguments for nationalisation are set out and the report then proceeds to deal with the records of nationalised industries. Improvements in technical efficiency or labour productivity are not by themselves satisfactory tests of efficiency of operation, it is said. The cost of such improvements has to be considered.

The report reviews the bases of charges to users of the services and the practice of calculating depreciation by the "historic cost" rather than the replacement cost method is criticised. It is noted that only the gas and electricity industries have come at all near to satisfying the normal commercial tests of efficiency. The price structure and methods of charging are considered to be unsatisfactory in a number of respects and the method of financing the public corporations is questioned.

It is not thought that labour relations generally have been improved by nationalisation. Next, the virtual impossibility of securing real "public accountability" is mentioned and the conclusion is arrived at that the record of the nationalised industries shows that they have not fulfilled the nationalisers' expectations.

B.E.A.M.A. Publicity Conference

THE third B.E.A.M.A. Publicity Conference was held in London on 11th and 12th November when nearly 200 delegates attended from B.E.A.M.A. member-firms. Mr. Lewis Hart, publicity consultant, Brush Electrical Engineering Co., Ltd., presided.

The speakers at the conference were Messrs. J. Cassels (director, Simmonds Postal Publicity, Ltd.) and S. H. Pryor (publicity manager, Igranic Electric Co., Ltd.) who presented papers on "Direct Mail Advertising"; Mr. C. Barwell (publicity manager, Mullard, Ltd.) who spoke on "The Assessment of Technical and Trade Press as Publicity Media"; Mr. K. Lockhart-Smith (joint managing director, Film Producers Guild, Ltd.) on "The Production and Use of Films"; Mr. H. F. Chilton (publicity manager, Horlicks, Ltd.) on "Television Advertising"; Mr. Derek Russell (head of publicity department, B.B.C.) on "The B.B.C. and Industry"; Mr. J. O. Knowles (chairman of the B.E.A.M.A. Council), who dealt with "Euromarket"; and Mrs. Beatrice Warde (Monotype Corporation) who spoke on "Typography and Printing."

The conference concluded with a luncheon at which Mr. Hart presided and introduced as the guest speaker Dr. Charles Hill, Chancellor of the Duchy of Lancaster. Dr. Hill spoke of the necessity for strengthening British propaganda overseas. He said that during his recent tour he found in all the countries visited a high regard for this country and its institutions and English was a *lingua franca* in all parts of the world. Great Britain was dependent on exports for its very existence and so relations with people in overseas markets must be assiduously cultivated.

In this connection he considered that the B.E.A.M.A. had rendered a great service to the country by arranging such an excellent display at the Brussels Exhibition. He commended the spirit which had prompted the organisation of the conference.

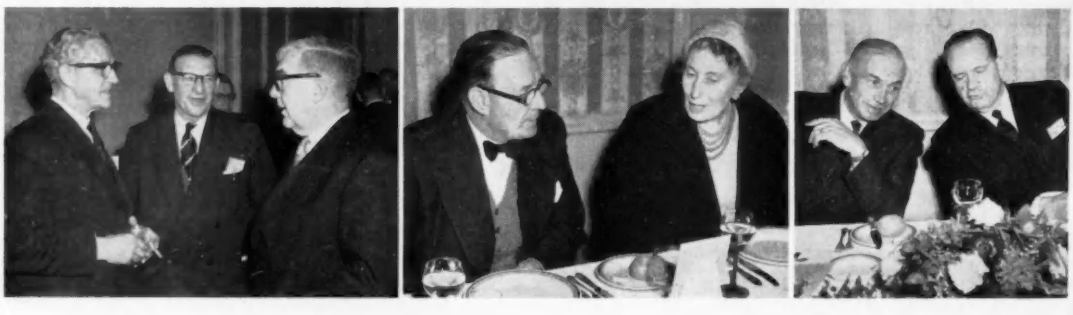
Col. B. H. Leeson, director of the B.E.A.M.A., in thanking Dr. Hill, mentioned the position of the electrical manufacturing industry as the country's second largest export group. He also referred to Dr. Hill's close connection with the electrical world as "landlord" of the Institution of Electrical Engineers.

Winding up the proceedings Mr. Hart thanked those who had made the conference so successful.

A.S.E.E. Diploma Scheme Examinations

THE Executive Council of the Association of Supervising Electrical Engineers announces that the 13th annual examinations to be conducted under the A.S.E.E. Diploma Scheme will take place at various centres throughout Great Britain on 26th, 27th and 28th May, 1959. Applications to enter should be made by 1st March next. A folder which gives details of the scheme may be obtained from the General Secretary, Association of Supervising Electrical Engineers, 23, Bloomsbury Square, London, W.C.1.

Left to right: Col. B. H. Leeson, Mr. Lewis Hart and Dr. Charles Hill, Mr. Felix Rogers and Miss Mary Gilbert, and Messrs. J. O. Knowles and D. Maxwell Buist



LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

An Architect's Approach to Floor Warming

IT was no surprise to me that Mr. S. L. M. Barlow should take up the point made in connection with withdrawable and non-withdrawable systems, nor that he should put forward all the engineering reasons in justification of his different view. He does, however, say that consideration of cost would need to be very strong to over-ride the engineering advantages.

It is not only in electrical matters that for years we have been over-designing some parts of buildings, and at the same time under-designing in terms of quality in other parts of the building. In fact, often the question of " How long should the building last ? " and the subsidiary question of " How long should various items of finishes and equipment last ? " are rarely put either by the building owner or its designer.

Mr. Barlow questions whether there is very much difference between burying unprotected lighting and power services in walls and ceilings, and unprotected heating cables in floors. I agree that there is little difference, but I think that in this context " protection " is rather a different matter from the provision of conduit to make a system withdrawable in the event of failure. In any case, how often has the provision of conduit for normal wiring enabled replacements to be made with no other disturbance ? In industrial and commercial buildings the 10-15 years' guaranteed life span of the cable before replacement is also long enough to see many other changes in the occupation and use of the structure—changes which necessitate not only rewiring but also revision of the whole layout, when most of the conduit provided can no longer be used.

With regard to the structural deformation of the building, in practice such movement, whether thermal or due to moisture or vibration, should be allowed for in the design of both the structure and electrical installation, and any serious failure in the building in this respect, if so bad as to fracture an embedded system, would almost certainly damage the withdrawable type of element.

It is, of course, dangerous to generalise and it is also true that flexibility is to-day required more than ever for the layout within a structure, and therefore a network of ducts and outlets for other services must be provided in many floors, but I do not see that this affects the embedded element more than a withdrawable one. The argument that tenants of buildings constantly cut holes in floors (or walls ?) does not seem to me to be a powerful one. Any piece of equipment misused or mishandled against the instructions provides trouble, and buildings are no different, but where does this provide the difference between the two systems ? Only, it seems, in the trouble and expense involved in locating and repairing the fault, and so we are back to a straight cost comparison.

The Midlands Electricity Board have developed a fault-finding gadget which will locate any fault in the system to literally within an inch or two. Thus the disturbance to the building structure and floor finish is immediately limited to the area required for practical repair to either the electrical system or floor finish. If the fault is in the building or in alterations being made to it, these would necessitate considerable disturbance and repair in any case.

Thus I think we have arrived at the state where the only factor to be considered is the need to replace the cables through their own ageing. Here we have cables running at black heat, and so I accept the manufacturer's statement that the life of either type of cable is for practical purposes indefinite. What will the relevant cost comparison be ? Let us take, for example, a housing scheme of 150 flats, with an installed load in each flat of 4·6 kW. Here the cost per flat to install the embedded system is £48 6s (£10 10s per kW approximately), a total capital expenditure of £6,245. With the withdrawable type the cost of a system would be about £20 per kW, a total of £13,800 for the scheme, to which extra costs for screeding around access troughs and fitting the floor finish around the access troughs could easily amount to £3 per flat, i.e. a further £450 on the total, making £14,250: a difference in capital costs of £8,005. The interest alone on this difference would amount (at 5 per cent) to £24,000 over the 60-year loan period for local government housing.

Looked at another way the savings on the loan charges would amount to £400 a year, and if each fault cost £50 to repair this would allow eight faults per year or 840 faults over the loan period. This would be equal to more than one fault in every room of every flat, or a 100 per cent failure! Would any opponent of the embedded system be prepared to suggest that anything approaching this degree of failure is even a possibility ?

It is true that I have chosen for this example a domestic installation, but a large number of schemes are being carried out in this type of building using withdrawable systems. In industrial situations different factors would apply, but many arguments which are set up in establishing the design for a particular situation would have a very different solution if the alternatives were genuinely costed. both in terms of the capital and resulting maintenance costs.

Lee, S.E.12. R. B. HELLARD.

I MUST challenge Mr. S. L. M. Barlow on the opinion he expresses in his letter relating to the article by Mr. R. Baden Hellard.

Surely if a pneumatic drill or any other tool is used to dig a hole in a concrete floor above an electric heating cable of the withdrawable type it will so damage the housing and cable as to render it impossible to withdraw or replace it, and the cost of repair in these circumstances will be far more than if the embedded type had been used.

Whilst the withdrawable type, as its name implies, should be capable of easy replacement of the heating cable, a hazard not mentioned by Mr. Barlow is that of corrosion between the cable and housing. Cases have occurred where actual welding of the cable to the housing prevented either withdrawal or replacement of the faulty cable.

The practice of embedding a heating system directly in a concrete floor is, of course, not confined to electricity; hot water engineers have adopted this practice for years, and the hazards they face are, I suggest, greater than ours.

An important advantage of directly embedding the cables is that a rapid transfer of heat takes place, thus

limiting the temperature of the cable, and ensuring a longer life.

I fully support the contention of Mr. Baden Hellard that providing care is taken to prevent damage during installation, the risk of failure afterwards is small, and on balance, having regard to the risks of either system, the installation of an allegedly withdrawable system is not worth the extra cost involved.

E. W. FAITHFULL, A.M.I.E.E., A.I.H.V.E.
Llanrumney, Cardiff.

MR. BARLOW could not have gone very deeply into his subject before writing his letter in which he criticises Mr. Baden Hellard's article.

Does Mr. Barlow know that the cost of an embedded system is generally half that of a withdrawable system; and does he realise that, with a block of forty average flats the approximate cost of the embedded system is £1,600, whereas the withdrawable system is £3,200 ? Is this his idea of a " little difference " in cost ? If so, he has a very unrealistic approach.

Furthermore, withdrawable cables are generally accommodated in either aluminium or light gauge steel conduit. Surely he does not expect these to afford the necessary protection should the tenants decide to fix door stops or furniture to the floor ?

Mr. Barlow is very optimistic if he considers that withdrawable cables need be replaced only once during the life of the building. These cables, being surrounded by air, work at a considerably higher temperature than embedded cables and are, therefore, subject to oxidisation, moisture attack and possibly electrolytic action. These factors may prevent the cables from being withdrawn and replaced successfully.

Also Mr. Barlow feels that an embedded cable can be subject to breakdown due to subsidence and vibration, but here again he has not really studied his subject. He must appreciate that there are embedded cables now on the market which have been specially manufactured as floor warming cables and as such are designed to overcome the objections he has raised. Obviously, no floor heating system can remain perfect if the floor subsides to any great extent, but I feel that the architect would be more concerned with the floor than with the heating system if this did arise. Again, I doubt whether the withdrawable system would stand any degree of movement. In any case the tubes would be partially flattened with the result that the cable could not be withdrawn.

When one considers the amount of embedded floor warming being installed throughout the country by responsible bodies, with the full approval and recommendation of their consulting electrical engineers, one feels that Mr. Barlow must be a little biased.

London, W.1. A. B. HILLIER.

POWER SUPPLY IN ONTARIO

THE levelling-off of Canada's economic expansion in 1957 was reflected in the rate of increase in power supply in Ontario, which was slightly below the long-term average. This trend, however, was evident only in the southern part of the province; total energy requirements in the north showed a record growth.

The overall output of the Hydro-Electric Power Commission in 1957 was 31,100 million kWh compared with 29,524 million kWh in the previous year, an increase of 5·3 per cent. Of this total, about 84 per cent was generated in the Commission's 64 hydro-electric and five thermal stations. The hydro-electric plants had a combined capacity of 3,630 MW, the largest development being at Niagara (1,512 MW). The main steam plants were the J. Clark Keith, Windsor (244 MW) and Richard L. Hearn, Toronto (372 MW), stations. In addition to electricity generated by the Commission, purchased power was equivalent to a plant capacity of 596 MW.

An analysis of sales shows that 49 per cent of the 28,514 million kWh made available was delivered to 351 municipal electrical utilities and 28 local systems for supply to retail customers; 43 per cent was supplied direct to 219 industrial customers; and 8 per cent was distributed to the Commission's 104 operating areas for sale to rural customers. Primary power supplied to industrial users included 250 million kWh for uranium mining, compared with only 59 million kWh in the previous year.

The main constructional work carried out during the year was on the St. Lawrence power project which was officially inaugurated on 5th September last by the Premier of Ontario and the Governor of New York. Of the 32 generating units in the United States and Canadian sections, 11 are now operating. At the Sir Adam Beck-Niagara No. 2 generating station the final stages were reached with the initial operation of the pumping-generating station (see *Electrical Review*, 7th November, page 849).

Thermal generation predominates in the Commission's plans for the future. The capacity of the Richard L. Hearn station is to be trebled and three other large stations are projected, two on the shores of Lake Ontario and one at Fort William. The Commission is also co-operating in the development of a 20 MW nuclear power demonstration plant.

By the middle of next year the huge task of standardising the supply frequency in the Southern Ontario system is expected to be completed. When it was begun in 1949 it was estimated that 784,000 customers would be involved and that it would be necessary to standardise or replace an average of 2·7 frequency-sensitive items for each domestic consumer. Actually, by the end of last year the equipment of 915,700 customers had been dealt with and in the Toronto area the average number of items per domestic consumer requiring attention is now 5·9. By the end of the year expenditure on this work had reached $322 million.

The Commission's accounts for 1957 show that gross revenue rose by 7·8 per cent to $201 million while expenditure increased by 8·1 per cent to $197 million.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton	£180 0s 0d
COPPER, H.C. Electro	ton	£244 10s 0d
Fire Refined 99·70%	ton	£243 0s 0d
Fire Refined 99·50%	ton	£242 0s 0d
COPPER Tubes	lb	2s 4½d
Sheet	ton	£274 5s 0d
H.C. wire and strip	ton	£288 15s 0d
LEAD, English	ton	£76 10s 0d
Foreign	ton	£75 0s 0d
MERCURY	flask	£78 0s 0d
TIN, block (English)	ton	£757 10s 0d
ZINC, G.O.B. Foreign	ton	£77 0s 0d
BRASS Tubes (solid drawn)	lb	1s 11d
Wire	lb	2s 8½d
PHOSPHOR BRONZE Wire	lb	4s 1½d
PLATINUM	oz	£21 5s 0d
RUBBER, No. 1 R.S.S. spot	lb	25½d—26d

PERSONAL AND SOCIAL

News of Men and Women of the Industry

Mr. R. L. Chantrill, B.Sc., M.I.E.E., M.Amer.I.E.E., technical director of the British Thomson-Houston Export Co., Ltd., who has been directing the survey work in connection with the proposed Peace River hydro-electric project, British Columbia (see page 960), joined the Switchgear Department of the British Thomson-Houston Co., Ltd., in 1924, and he has had a long and wide experience of electrical power development in India. From 1929 to 1932 he was on loan by the B.T.H. to the Government of the Punjab, and during the following years, until 1949, he was on the engineering staff of Associated Electrical Industries (India), Ltd., except for a six months' period in 1935 when he served with the Hydro-Electric Department of the Government of the North West Frontier Province as technical adviser. In 1942 he was appointed chief engineer and elected a director of the Associated Electrical Industries (India), Ltd., in charge of the engineering department, and in 1949 he was a member of the technical mission of A.E.I. in connection with the preparation of a report for the Government of India dealing with the possible establishment of a heavy electrical plant factory in India. He was appointed chief technical engineer of the B.T.H. Export Co. in 1949 and became a director of the company in 1951.

Mr. R. L. Chantrill

Mrs. M. E. Pickford, B.Sc., head of the Housecraft Department of the Electrical Association for Women, has been appointed education officer, with combined responsibility for the housecraft and educational sides of the Association's work. **Miss E. L. Mulligan** becomes examinations officer, and will deal with the day to day work in the Examination Department. **Miss O. M. Price** becomes housecraft officer and will be in charge of the practical work in the Housecraft Department.

At a meeting of the Council of the London Chamber of Commerce on 11th November **Mr. A. L. Stock,** managing director of the Morgan Crucible Co., Ltd., was elected chairman.

Mr. L. A. Mills has been appointed commercial manager of the Osram Lamp Division of the General Electric Co., Ltd. Mr. Mills, who joined the G.E.C. in 1928, has been closely concerned with the marketing arrangements for Osram lamps and tubes in the United Kingdom for many years and was formerly deputy manager of the Osram Lamp Department. His new appointment is a part of the reconstitution of the company's general products group into divisions.

The Board of Governors of the International Atomic Energy Agency has appointed **Sir John Cockcroft** to serve on its Scientific Advisory Committee. The decision to establish the committee was taken by the Board in September. Its function is to provide the Board and the director-general with advice on scientific and technical questions arising out of the Agency's programme submitted to it by the director-general either on his own behalf or on behalf of the Board.

The sixteenth conversazione of the Henley education scheme, organised by **W. T. Henley's Telegraph Works Co., Ltd.,** was held at Woolwich Polytechnic on 15th November. Students from all parts of the company's organisation attended, together with their parents and friends. Sir Alexander Sim (chairman of the company) received the students and guests, who included many educational executives and representatives of industry. Dr. P. Dunsheath, C.B.E., director of Henley's and chairman of the education scheme, in an opening speech, described some of the facilities made available to students by the scheme, and the advantages which were offered. The response by students was reflected in the fact that this year a record number of 122 had qualified for awards. The presentation of the awards by Sir Alexander Sim followed. These included awards for handicraft work shown in the exhibition as well as awards for examination successes. A challenge trophy, for the most outstanding exhibit, was won by P. Saul of the Woolwich Works. Then followed an address by the guest speaker, Sir Herbert Walter Butcher, M.P. J. Mantel, student apprentice, replied on behalf of the students. After a break for tea, members of the Eltham Little Theatre staged a dramatic scene entitled "Centenary of the First Atlantic Cable." This was followed by the showing of a film—"Atlantic Link"—dealing with the recent trans-atlantic telephone cable project. "Electrical Progress in Action" was the theme of an exhibition which was held in conjunction with the conversazione. The exhibits, which were provided by British Railways, the G.P.O. and many electrical engineering and instrument manufacturing firms, provided examples of the wide variety of applications of electrical control and the uses of electronics. These included railway signalling, metering equipment, underwater lighting and communications, and modern electric office equipment. Allied with the exhibits were display panels showing the wide range of cables produced by Henley's to meet the needs of these new developments. Alongside this exhibition was a display of students' handicrafts.

Sir Alexander Sim (chairman, Henley's) presenting an award for an examination success and the challenge trophy for handicraft work to Mr. P. G. Saul (apprentice, Woolwich works)

Mr. G. R. Morgan, thermal operations engineer with the Hydro-Electric Power Commission of Ontario, will be in this country from 12th December to 10th January. His address will be 12, Monksdene Gardens, Sutton, Surrey (telephone: Fairlands 9068).

Universal Metal Products, Ltd., Langley Road, Salford, 6, Lancs., announce that **Mr. J. G. Wilson,** general sales manager of Universal Metal Products, Ltd., has been elected to the board of the company. **Mr. J. Kenyon,** sales manager of the company's plastics division, has been appointed general manager of the plastics division.

For the second year the **Telecommunication Engineering and Manufacturing Association** has held a competition for the best final-year apprentices of its member firms in three categories. Awards to the value of £25 were presented to Mr. A.

Proudman, B.A. (graduate in training, Standard Telephones & Cables, Ltd.), Mr. R. Hartshorn (student apprentice, Automatic Telephone & Electric Co., Ltd.) and Mr. R. M. Lane (technician apprentice, Standard Telephones & Cables, Ltd.) at the annual dinner of the Association on 12th November by the chairman, Mr. F. T. Jackson, O.B.E.

A dinner to which all employees of **Aberdare Cables, Ltd.**, with more than five years' service were invited was held at the Cardiff City Hall on 14th November to celebrate the company's 21st anniversary. After loyal toasts to the Queen and Prince of Wales, the toast "The Company" was proposed by Lord Brecon, Minister of State for Welsh Affairs. In his speech he paid tribute to the founders of the company, which he described as having a firm place in the industrial scene in South Wales. He said that more firms of this type were required giving local opportunities, and he commended the company's apprenticeship scheme. Mr. H. A. Lamb, the general manager, who replied, gave a brief outline of the company's growth.

The chairman, Sir John Pascoe, in proposing the toast of the guests said that they had never regretted the decision to start in South Wales despite the gloomy prophesies that had been made. Mr. G. Morgan, director of the South Wales Division of the National Coal Board, replied to the toast.

The newly instituted long service awards were presented to members of the company by Lady Pascoe, who was introduced by one of the company's founders, Sir George Usher. In the absence, due to illness, of Viscount Hall, Mr. H. C. De Falle proposed the toast "Our People," to which the reply was made by Councillor C. Edwards.

The North Midland Centre of the **Institution of Electrical Engineers** held its annual dinner on 14th November at the Queen's Hotel, Leeds, when the chairman, Mr. J. D. Nicholson, presided over some 270 members and guests. The principal guests included the Right Rev. G. W. Clarkson, M.A., Bishop of Pontefract, Mr. S. E. Goodall, M.Sc.(Eng.) (I.E.E. President), Mr. W. K. Brasher, C.B.E., M.A. (secretary), and his son, Mr. C. W. Brasher, B.A.(Cantab.). The toast to the Institution and the North Midland Centre was proposed by the Bishop of Pontefract and in his response Mr. Goodall laid stress on the leading and important part the Institution and electrical engineers generally were playing in world affairs. The toast to the guests was proposed by Mr. Nicholson, and replying for the guests Mr. Chris. Brasher appealed for a greater understanding of the coming generation and for more efforts to be made towards helping them to devote more of their leisure time to athletics and sport and similar more mentally profitable activities.

Mr. M. R. Cowan, B.Sc., A.M.I.E.E., senior assistant engineer in the organisation and methods section at the North Western Electricity Board headquarters, Manchester, has been appointed consumers' engineer to the Board's No. 2 Sub-Area at Bolton. He succeeds **Mr. L. Loukes,** who retires on 8th December.

Mr. M. R. Cowan

Mr. Cowan was educated at Manchester Grammar School and Manchester University. He subsequently served in the Forces from 1946 to 1948, attaining the rank of captain in the R.E.M.E. He was for some time officer in charge of a technical publication section attached to the War Office. Mr. Cowan has occupied several posts in the No. 1 Sub-Area of the North Western Electricity Board and in 1956 he was seconded to headquarters.

Marconi's Wireless Telegraph Co., Ltd., announces the appointments of **Mr. S. C. Heward,** B.Eng., A.M.I.E.E., as manager, associated companies division, and **Mr. G. T. Kelsey,** O.B.E., as manager of the company's London office.

Mr. Heward joined Marconi's as an installation engineer in 1937 and has served the company abroad in this capacity and also on sales promotion. He was for two and a half years its representative in Pakistan, followed by a six months' tour as manager of Marconi (China), Ltd., in Hong Kong. In his new post Mr. Heward is responsible, within the Export Department, for technical liaison with the many overseas associates of the Marconi Co.

Mr. S. C. Heward

Mr. G. T. Kelsey

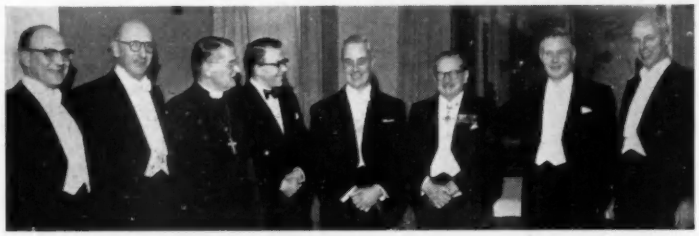
Mr. Kelsey was awarded the O.B.E. and was twice mentioned in dispatches in recognition of his work in the Radar Branch of the Royal Air Force during the war. This work included the responsibility for organising over 200 mobile radar stations for the D-day and Arnhem operations. He joined Marconi's eight years ago as assistant to the manager of the Radar Division and eighteen months later was appointed the company's London representative.

The thirty-first annual ball of the **British Thomson-Houston (Willesden) Social and Athletic Club** was held at Wembley Town Hall on 13th November. Once again the occasion proved to be a great success and during the dancing, which continued until midnight, many prizes were presented. Over 200 were in attendance and the principal guests included the Mayor and Mayoress of Wembley, sports celebrities Judy Grinham and Colin Smith, and senior members of the company's Switchgear Engineering and Switchgear Contracts Departments.

Mr. W. Imrie Smith, B.Sc., F.I.E.S., chief lighting engineer of the Benjamin Electric, Ltd., left London by air on 10th November for Italy, where he is to examine and discuss the techniques of indoor and outdoor lighting applications in Milan, Turin and Rome.

Mr. F. Millington, street lighting technical assistant to Chesterfield Corporation, who has been on the Corporation staff for the past ten years, has been appointed deputy lighting engineer at Nottingham. He will take up his new duties in January next.

The North Western Branch of the **Electrical Trades' Commercial Travellers' Association** held its annual general meeting at the Waggon and Horses Hotel, Manchester, on 10th November. The following officers were elected: Mr. G. P. Humphry (chairman), Mr. F. Foulkes (vice-chairman), Mr. F. Sullivan (secretary), Mr. W. Smith (treasurer) and Mr. C. J. S. Roberts (charity steward).



At the North Midland Centre, I.E.E. annual dinner. Left to right: Mr. W. J. A. Painter, Mr. S. E. Goodall (president, I.E.E.), the Bishop of Pontefract, Mr. Chris Brasher, Mr. F. W. Fletcher, Mr. W. K. Brasher (secretary, I.E.E.), Mr. J. D. Nicholson (chairman, North Midland Centre), and Professor G. W. Carter

Mr. W. W. Blears, the retiring chairman, presented past chairmen's jewels to Mr. J. B. Jones and Mr. R. H. Corlett. The chairman asked for the full support of all members at meetings and social functions, and said that they should all make a special effort to introduce new members. It was decided to defer making any donation to charity until the amount available from the Christmas draw is known. A collection by the new charity steward, Mr. C. J. S. Roberts, realised £2 17s 6d.

Mr. T. J. O'Reilly, A.M.I.Mech.E., has been appointed station superintendent of the Oxford generating station. Mr. O'Reilly was born in South Wales and received his technical education at the Acton and Portsmouth Technical Colleges. After an apprenticeship with Imperial Chemical Industries, Ltd., he held various positions at the Fulham, Barnes and Earley generating stations before taking up his present position as electrical maintenance engineer at Portsmouth power station.

The annual general meeting and luncheon of the Birmingham and District Branch of the **Electrical Industries Benevolent Association** will be held on 12th December (1 p.m.) at the Imperial Hotel, Birmingham.

The **Ipswich and District Electrical Association's** ladies' festival was held at the Royal Hotel, Clacton-on-Sea, Essex, on 14th November, and was attended by some 230 members and guests. Mr. A. White, chairman of the Association and branch manager of the G.E.C., Ipswich, received the guests, among whom were Sir Charles

At the Ipswich and District Electrical Association's ladies' festival. Left to right: Mrs. A. White and Mr. A. White (chairman), receiving Mr. and Mrs. P. Sydney

and Lady Westlake, Mr. and Mrs. S. C. Sutton, Mr. and Mrs. D. E. Kidner and Mr. and Mrs. P. Sydney. In accordance with tradition, no speeches other than the normal toasts are given at this function.

After examining well over 1,000 entries in the competition which the **British Electrical Development Association** ran in connection with the

Mr. J. R. Kinnersley (L.E.B.) presenting a prize of five pounds to Miss Margaret Knight, winner of the E.D.A. competition organised in connection with the Schoolboy's Own Exhibition

last Schoolboy's Own Exhibition, the judges decided that an entry by a girl was the best. The winner was Miss Margaret Knight, aged 13, of Woodford Green, Essex, who received a prize of £5. Mr. J. R. Kinnersley, M.I.E.E., manager of the Essex Suburban District of the London Electricity Board, presented the cheque at an informal gathering at the Ilford showrooms. The competition was in the form of a "quiz." Visitors to the E.D.A. stand were given a card and during their tour of the stand they had to answer ten electrical questions. The best set of answers, the neatest card and the person's age were all taken into consideration when deciding the winner. One of the questions asked was "Have you electric cooking at home?" to which 40 per cent said "Yes." Another asked if the young man or woman was interested in a career in the electrical industry and 18 per cent said that they were.

On Monday and Tuesday last week the **Portland Players** (Central Electricity Headquarters Sports and Social Club) presented Terence Rattigan's "Separate Tables" at King George's Hall, Adeline Place, W.C.1. The play is in reality two short plays, for although most of the characters appear in both, each act covers an episode in the lives of the residents in a private hotel in Bournemouth. This means that the players have to adjust themselves to two plots, and that the Portland Players did so successfully, indicates the strength of the society. In the first act, the leading players were Anthony Moss (as Mr. Malcom) and Barbara Hughes (as Mrs. Shankland), and in the big scene between them they both gave fine performances. The principals in the second act were Edward Errington (as Major Pollock) and Jane Turner (as Miss Railton-Bell), and they also gave moving performances. These players were ably supported by the other members of the cast, of whom special mention should be made of James Rintoul (as Mr. Fowler) and Jeanne Kingswood (as Mrs. Railton-Bell). The whole performance was first class and the Society is deserving of better support than that accorded it on the night we attended.

Mr. J. R. Thomas and **Comdr. E. G. Sutton,** R.N. (Retd.), have been appointed directors of John Thompson (Wolverhampton), Ltd.

OBITUARY

Mr. W. H. Steele.—The death occurred on 3rd November, at the age of sixty-two, of Mr. William Herbert Steele, M.I.E.E., F.G.S., of the System Operation Department, South Eastern Division, Central Electricity Generating Board. Mr. Steele was educated at Parkstone Collegiate School and Poole Secondary School. His first appointment in the electricity supply industry was in 1912 when he was appointed a general assistant on installation work with the Bournemouth & Poole Electricity Supply Co.

Subsequently he served in the Newport Electricity Department, the R.F.C. (in the 1914-18 war), the South Wales Power Distribution Co. and the Central Electricity Board. With the C.E.B. he became control superintendent in charge of the underground centre near St. Paul's. With the reorganisation of the industry in 1948 Mr. Steele joined the System Operation Department of the B.E.A. and with the sub-division of the St. Paul's control room into two centres, he transferred to the Thames South centre where he remained until his death.

Mr. W. S. Hall, M.B.E., J.P., chairman of the North Eastern Electricity Consultative Council, died on 12th November. He had been chairman of the Consultative Council and a part-time member of the North Eastern Electricity Board since 1948.

Mr. A. S. Dodds, director and London manager of John Thompson Water Tube Boilers, Ltd., died on 4th November. He joined the John Thompson group seven years ago from Messrs. Merz & McLellan, with whom he was senior engineer at Newcastle-upon-Tyne. When, in 1957, Mr. C. J. Howard moved to Wolverhampton to become managing director of John Thompson Water Tube Boilers, Ltd., Mr. Dodds succeeded him as manager of the company's London offices.

Mr. C. T. Dunn.—The death has occurred of Mr. Charles T. Dunn, A.M.I.E.E., Solihull district manager for the Midlands Electricity Board, who collapsed and died at a whist drive. After leaving Birmingham University, Mr. Dunn joined the Birmingham Electricity Department in 1923, and later became a district engineer with the central district. Before the formation of the M.E.B. he moved to Solihull, and was afterwards promoted to district manager for the area.

NEW BOOKS

Telecommunications. By W. Fraser. Pp. 772; figs. Macdonald & Co. (Publishers), Ltd., 16, Maddox Street, London, W.1. Price 65s.

A need has existed for a long time for textbooks on telecommunications suitable for students reading for the engineering degree of the University of London and for those who are studying for allied examinations of the Institution of Electrical Engineers and of the City and Guilds Institute. The book under review is a welcome addition to the limited number now available. It is well written, easy to read, not highly mathematical and will undoubtedly appeal to the average student who likes to feel that all he needs is in one book. It is based upon Mr. Fraser's considerable experience as a university lecturer.

The treatment, in general, is conventional and illustration by worked examples is frequent. Relevant questions from examination papers appear at the end of each chapter and answers are given to over one hundred which are of a numerical nature.

There is little to criticise adversely, since it is obvious that considerable care and thought has gone into the preparation of the book. The diagrams are clear and conveniently near to the pertinent descriptive material. It would have been helpful if typical component values had been given in circuits of oscillators, amplifiers and other devices, since this helps to eliminate a sense of vagueness which the student of limited circuit experience feels when confronted for the first time with an apparently complicated diagram. The use of small letters to indicate vector values in some parts of the text is deprecated, since these are usually reserved for instantaneous values. In the treatment of the reduction of distortion in amplifiers by the application of negative feedback, some laxity is evident, though the result is approximately correct.

However, the book can be well recommended as it adequately fulfils its purpose. In conclusion, it is thought advisable to point out that the book is extremely bulky since very thick paper has been used, and this fact may raise a question in the mind of a student who would like to be able readily to carry the book about.—L.C.W.

BOOKS RECEIVED

Electrical Fault Diagnosis. By S. Spence. Pp. 134; figs. Electrical Times, Ltd., Sardinia House, Sardinia Street, London, W.C.2. Price 15s, post free.

Radio Communications. By W. Lovering. Pp. 536; figs. Longmans, Green & Co., Ltd., 6 & 7, Clifford Street, London, W.1. Price 60s.

Telecommunications. By A. T. Starr. Pp. 470; figs. Sir Isaac Pitman & Sons, Ltd., Pitman House, Parker Street, Kingsway, London, W.C.2. Price 37s 6d.

Tables for Solving the Laplace Equation inside an Ellipse. By A. I. Vzorova. Pp. 255; figs. Infosearch, Ltd., 16, Ladbroke Gardens, London, W.11. Published by Cleaver-Hume Press, Ltd., 31, Wright's Lane, Kensington, London, W.8. Price 50s.

Refrigeration Simplified. By Robert C. Scutt. Pp. 82; figs. Robert C. Scutt, 52, Hadley Way, Winchmore Hill, N.21.

Circuit Analysis of Transmission Lines. By J. L. Stewart. Pp. 186; figs. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 44s.

Electric Machinery. By Clifford C. Carr. Pp. 537; figs. John Wiley & Sons, Inc. Chapman & Hall, 37, Essex Street, London, W.C.2. Price 74s.

Electrical Industries Ball

LAST Friday the annual ball organised by the Electrical Industries Benevolent Association was held at Grosvenor House, London, W.; about a thousand people including many of the leaders of the profession and industry were there. The guests were received by the president of the E.I.B.A., Dr. T. E. Allibone, F.R.S., and Mrs. Allibone.

After dinner Dr. Allibone announced that the customary telegram had been sent to the Queen, the Association's patroness, and a reply had been received wishing the Association a successful evening. Later Dr. Allibone mentioned that the usual collection for the Association's funds would be made. He said that although last year the gross income had risen by 20 per cent there was a need for more money to enable the work to be extended.

During the evening there was a draw for fifty-one prizes presented by companies in the industry and an excellent cabaret. The music was provided by Geraldo and his orchestra. We are informed that the Association's funds will benefit to the extent of over £2,000 from the ball.

The President and Mrs. Allibone greet Mr. and Mrs. C. R. King and Mr. and Mrs. H. S. Pocock. (Right) Mr. C. T. Melling with Dr. Allibone

1.—Mr. and Mrs. R. Marryat with Miss Marryat, Mr. and Mrs. A. V. Moon, Mr. J. Spain, Mr. and Mrs. L. Morton, Mr. and Mrs. G. Monkhouse and others. 2.—Mr. H. Senior Fothergill (secretary, E.I.B.A.) and his guests. 3.—The President's table. 4.—Mr. and Mrs. H. Riley with Mr. and Mrs. F. J Blackwell, Mr. and Mrs. P. B. Etheridge and Mr. and Mrs. J. H. Hirst. 5.—Messrs. L. C. Penwill, V. J. Stock and J. G. Briggs with their ladies. 6.—Mr. W. J. Bird's guests included Mr. and Mrs. J. Mortimer Hawkins, Mr. and Mrs. W. Lewis Smith, Mr. and Mrs. S. B. Warder, Mr. and Mrs. A. L. G. Lindley and Mr. G. A. Baricalla. 7.—Mr. H. G. Towner presents chocolates to the leading programme girl. 8.—Guests at Mr. F. C. Baumann's table. 9.—Mr. and Mrs. D. B. Beavan and guests

Nuclear Fuel Element Fault Detection

IN the gas-cooled graphite-moderated nuclear power reactors at present being constructed for the Central Electricity Generating Board one of the major instrumentation requirements is the rapid detection of faulty fuel elements, and several variants of the basic Calder Hall method are being developed.

Samples of the cooling gas are taken regularly from numerous points within the reactor and ionised radioactive particles present are electrostatically precipitated on a wire and exposed, after a definite delay, to a scintillation counter for a fixed period. A pulse is produced for every radioactive event detected and these pulses are summated by a ratemeter, the output of which is compared with a pre-set reference and recorded graphically. If the reference for a particular point is exceeded an alarm is given and its value and position automatically printed. To ensure that such a system has maximum reliability self-checking facilities must be provided, the "fail to warning" concept used throughout, and the instruments designed with the stations' estimated life of over twenty years in view.

Ratemeter and analyser for Hinkley Point detection system

At their St. Albans laboratories Marconi Instruments, Ltd., are developing the detection system for the nuclear power station under construction at Hinkley Point in Somerset. The photograph shows the ratemeter and analyser developed for this system, with the scanning and synchronising components in the lower portion of the rack. The electrically operated typewriter, mounted on its driving unit which converts the analogue output of the ratemeter into digital form, is used for alarm and routine tabulation.

Rocky Mountains Project

AT a Press conference in Vancouver last week the Premier of British Columbia (Mr. W. A. C. Bennett) announced plans for the development of up to 8,000,000 h.p. of hydro-electric power from the Peace River. Of this half would be generated at an initial large dam and the remainder at smaller dams to be built later.

The scheme, preliminary details of which were made known last year (*Electrical Review*, 18th October, 1957, p. 709), is part of an overall plan for the exploitation of the north-eastern part of the province by the Wenner Gren B.C. Development Co. with which the Government of British Columbia signed a memorandum of intention in November, 1956. In the following March the British Thomson-Houston Export Co. were appointed by Wenner Gren as technical advisers in the development, application and use of electrical power in the area.

Drilling of potential dam sites was started at the end of January last and a report has been submitted by the B.T.H. Export Co. confirming the feasibility of the project. To implement the scheme a new company, the Peace River Power Co., Ltd., has been formed and held its first board meeting last week. The participants are the Wenner Gren organisation, the B.C. Electric Co., the Power Securities Corporation, Ltd., and Associated Electrical Industries, Ltd. The B.C. Power Commission has also been invited to take part, but this requires legislative approval. The chairman of the company is Sir Andrew McTaggart (Power Securities Corporation) and the vice-chairman Mr. Bernard Gore (Wenner Gren); Mr. C. Mainwaring (formerly vice-president, B.C. Electric) is president. The directors include Earl Alexander, Lord Tweedsmuir, Mr. W. H. Hill-Wood and Mr. R. L. Chantrill (technical director, B.T.H. Export Co.) who has conducted the work from its inception.

Home Economics in America

THE importance attached to the teaching of home economics in schools and colleges in the United States and Canada, and its extension to cover all aspects of family life, were among the impressions of a month's visit to these countries described by Mrs. E. M. Pickford in London last week in the 14th Caroline Haslett Trust lecture. Mrs. Pickford, who is head of the housecraft department of the Electrical Association for Women, also commented on the vast range of domestic electrical appliances available, the variations in price in different shops and the effects of advertising.

The Caroline Haslett Trust Travelling Scholarship was awarded to Mrs. Pickford to enable her to attend the Ninth International Congress on Home Economics held at the University of Maryland earlier this year, and in summarising the work of the Congress she referred to the ways in which home economists could help consumers with the modern problem which, she said, was not *whether* to buy, but *what* to buy. In America, home economists were held in high regard by the electrical industry and she quoted the example of the co-operative organisations set up by the supply authorities, retailers, manufacturers and contractors, which not only promoted electrical living by increasing sales of appliances and services, but by giving "excellent advice to the consumer on the choice of appliances, safe usage, and good installation." At such an organisation in Washington the display of appliances was supplemented by a demonstration theatre with rotating and elevator stages.

Mrs. E. M. Pickford examining one of the latest American cookers in Philadelphia

VIEWS on the NEWS

By REFLECTOR

MOST domestic electrical accidents seem to be caused by faulty flexibles, but it is possible for trouble to arise when the flexes are sound. Reports of the recent death of a small child show that her mother had boiled an electric kettle and had taken it away, leaving the connection still plugged in and therefore "live." The child apparently took up the connector and received a fatal shock. It is unfortunately common practice for women (and some men I suppose) to disconnect appliances in this way and while the terminals of most connectors are well shrouded it is still possible for small fingers to get into the entries. One way of getting over this would be to make the connections of appliances permanent, as is generally the case with electric fires and other equipment. But it is often convenient to be able to remove the flex and, of course, to easily replace the connector and flex by a spare when something goes wrong. The supply authorities should stress the undesirability of removing appliance connectors without disconnecting them from the supply.

* * *

Mr. J. M. Fraser, of the Electrical Development Association has replied to the "Constant Hot Water" letter in the *Observer* to which I referred in last week's notes. He says that all hot water tanks should be properly lagged; if they are not they naturally lose their heat rather rapidly. Mr. Fraser calculates that to keep up the temperature of water in a 30 gallon unlagged tank there will be an expenditure of about half a unit per hour. With three inches of lagging this loss can be reduced to one or two units a day. Another correspondent backs the writer of the original letter, but says that there is no need to switch an immersion heater on and off by hand; a time switch can be installed to do the job. I think it better to reserve the time switch for off-peak purposes. Still the writer of the letter does say that "Any good contractor can fit this device." He might have advocated "Do it Yourself."

* * *

A great deal of interest is added to the Electrical Industries Ball by the selection of winners of prizes so generously presented by electrical concerns. These gifts are by no means entirely electrical; some are portable and others are useful articles quite outside the electrical range. This year, somehow or other, a portable gas fire crept in. Did the donors imply that not all electrical people are too biased to patronise our rivals ?

* * *

Bearing in mind the international prestige which the Jodrell Bank radio telescope has earned for this country, it is astounding to find the Manchester University appealing for contributions towards its cost. There appears to be a deficiency of £150,000 to be made up and last week Sir Raymond Streat, on behalf of the University's Court of Governors, spoke of the unforeseen circumstances which had led to a much higher expenditure upon the telescope than was anticipated; he put the final figure at between £660,000 and £680,000, according to the *Manchester Guardian*. Sir Raymond said that Simon-Carves, Ltd., and Henry Simon, Ltd. (who one would imagine are not directly interested in the use of the telescope) had each given £10,000. There have been suggestions that the United States and Russia, who have benefited from observations by the telescope, should contribute, but surely this would be a trifle undignified, to say the least.

* * *

People in the electrical industry are well aware of the circumstances which make it impossible for the Electricity Boards to meet immediately all the demands for extensions made upon them, but it is hard for those awaiting a supply to understand why their needs (which, of course, are always more urgent than others') are not attended to. A complaint of this sort is quoted in the *Chester Chronicle*. Mr. N. Moore writes in the Cheshire news-sheet of the National Union of Agricultural Workers calling for stronger action to force the hands of the electricity authorities. He attacks the "Plan" of the Electricity Board by which work is carried out in strict order, regardless of the urgency of particular cases. I do not suppose that the plan is immutable and that really necessitous cases would not be dealt with. The terms "plan" and "planners" are constantly used in a derogatory way nowadays, as though disorder or chaos were preferable.

* * *

Sixty years ago, when the *Electrical Review's* offices were in Ludgate Hill, the following complaint appeared in the journal (25th November, 1898):—

> "Last week while the Court of Common Council was discussing whether it was in a position to grant permission to the Metropolitan Electric Supply Company to come into the City area and compete with the City of London Electric Lighting Company, the latter company's supply was causing the greatest possible annoyance to consumers. The offices of the *Electrical Review* are, unfortunately for us, taking current from the mains of the City Company, and on Thursday last week, when London was enveloped by a not uncommon November fog, it was no easy task to read proofs under a nearly new 8-C.P. 100-volt lamp. The complaint was general throughout the City. A consumer in Upper Thames Street writes to the City Press to send up 'A wail of complaint,' as he calls it, respecting the disgraceful manner, etc., etc. He says that during the fog last week the light was about equal to a tallow candle of the Georgian era. He adds that if the City Company cannot do better, it is time that the citizens took means either to revert to gas, or to break down the existing monopoly."

I should have thought that the *Review's* 8 c.p. lamp wasn't all that much better than the Georgian tallow candle.

Automatic Control Equipment

Activities of the Electronics Division of English Electric

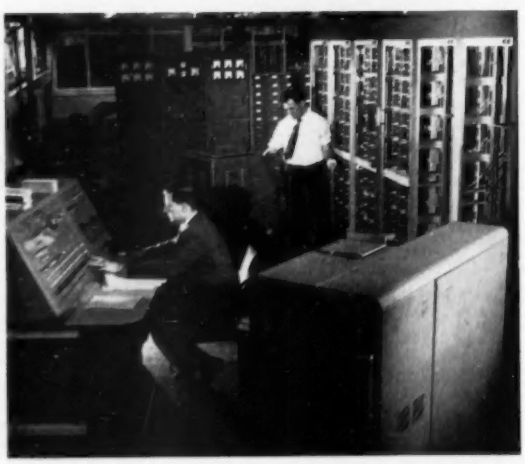
TO meet the demand for accurate control equipment for heavy electrical plant, the English Electric Co., Ltd., decided in 1952 to concentrate its efforts on the control field in one department. A site for a new works was selected at Kidsgrove, near Stoke-on-Trent, and the works was built during 1952 and 1953. A major extension to these works was completed this year which doubled the floor area. Over 1,000 people are now employed at Kidsgrove, which provides production facilities for the DEUCE computer as well as the original manufacturing capacity for various types of control equipment. Computers and control equipment are thus being made side by side in one factory with a view to the development of future automatic control schemes.

Last week we visited the Kidsgrove works and saw some of the company's activities, including the manufacture of magnetic amplifier, contactor and electronic control systems, electronic sensing apparatus, transistor applications and various cast resin processes.

During our visit we were also able to see some of the development work being carried out on the DEUCE digital computer at the Nelson Research Laboratories at Stafford. A DEUCE computer, fitted with magnetic tape auxiliary storage, was demonstrated and we also inspected the DEUCE Mark II. The DEUCE first made its appearance in 1955, and was described in our issue of 25th February, 1955. The original model utilised 32 columns of 80-column punched cards, but was further developed to utilise 64 columns and is now designated the DEUCE Mark I.

The company has recently introduced the Mark II and Mark IIA which are operated from a fast combined input/output unit which utilises the full 80 columns of the standard punched card. The Mark IIA has a 50 per cent greater high-speed store than either Mark I or Mark II. All types of DEUCE may be fitted with magnetic tape auxiliary storage and a high-speed paper tape input and paper tape output are also available.

Main frame assembly of a DEUCE Mark II computer under test at the Kidsgrove works of the English Electric Co.



We were informed that there are now more than twenty DEUCE installations in daily service; the installation at Bankside House was described in our issue of 10th October last. An interesting feature of the computer is that all production developments have been based on the principle of compatibility in that all modifications since the original DEUCE can be carried out on all machines.

Public Transport Association

THERE was a gathering of nearly 600 at the annual dinner of the Public Transport Association held on Thursday last week at the Connaught Rooms, London, under the chairmanship of Mr. T. R. Williams. The toast of the Association was proposed by Viscount Monckton, who said that its membership covered every possible interest in road transport. It was the largest association in that field and its members were responsible for 142 undertakings with a total of 30,000 vehicles.

In responding, Mr. Williams referred to unfair competition which the public passenger road transport had to face from private car ownership, by the imposition of the speed limit and the penal fuel taxation. He also objected to the limitation in the size of vehicles to 30ft; they could be extended to 35ft or more. If these restrictions could be removed there would be considerable economic benefit to the country. Mr. Williams also proposed the toast to the guests and mentioned some of the distinguished men who were present, particularly referring to Mr. G. R. H. Nugent, M.P., Joint Parliamentary Secretary, Ministry of Transport and Civil Aviation.

Mr. Nugent, in replying to the toast, paid tribute to the service which the members of the Association were providing up and down the country, particularly in rural areas, without which people in the country would be without any means of transport. Referring to competition with motor cars, he thought this was not so much a question of economics but one of pride in private ownership.

TRENDS IN WELDING

THE future expansion of the welding industry was discussed by Mr. John Strong, chief executive director of British Oxygen Gases, Ltd., in his presidential address to the Institute of Welding recently. Observing that a very wide range of arc welding processes was already available to industry, some having been evolved quite independently, he asked if an amalgamation of some or all of the processes could now be achieved. Examples of what had already been done in this direction, he said, lay in the use of CO_2 shielding with an automatic flux-covered electrode; the use of gas shielding with magnetic flux; and automatic flux-covered electrodes working under a fused submerged arc flux.

To reduce the number of processes to, say, three or four would at once permit further rationalisation of automatic welding head designs and a greater standardisation of electrical power supply equipment. It was possible to see this coming now in the automatic and semi-automatic welding heads which would cater for four or more of the current processes, and a similar trend was appearing in the various forms of electric power supply.

In connection with automatic welding Mr. Strong said it was possible that equipment would become more intricate in itself in order to have a more universal and simplified application, and if this happened the need for a complete machine to operate to a guaranteed performance would become increasingly apparent. The welding industry had now reached a stage when consolidation was perhaps the most important factor to be borne in mind.

Registration of Contractors

PROGRESS OF COUNCIL'S WORK

THE latest Progress Report (No. 6) of the National Inspection Council for Electrical Installation Contracting, covering the third quarter of the current year, refers to the removal of the Council's offices to Aldine House, Bedford Street, London, W.C.2 (Covent Garden 1163/4). New members of the Council are the Rural Industries Bureau, the States of Guernsey Electricity Board and the Isle of Man Electricity Board. Particulars are given of the applications for entry to the Roll of Approved Electrical Installation Contractors and of the circulation of the "Common Installation Faults" pamphlet prepared by the Council; originally 8,000 copies of this were ordered but the demand has necessitated the printing of a further 5,000.

Enrolment of Local Authorities

As the object of the scheme is to protect the public against faulty installation work it had been felt that it was not appropriate to enrol as approved contractors departments of local authorities carrying out work solely for those authorities. Now it has been decided, however, that for a twelve-month experimental period local authorities and other statutory bodies who carry out electrical installation work in premises for private occupation by direct labour shall be invited to conform to the Council's rules relating to enrolment and undertake the same obligations as approved contractors, with appropriate modifications. The annual fee for these authorities will be ten guineas. Publicity is dealt with in another section of the report; activities in this field have included contact with the B.B.C., the Press, and displays at agricultural shows. The South Western Electricity Board has produced a folder explaining what the scheme means. Contacts are being established with Chambers of Commerce, architects, builders, and Women's Institutes, and Electricity Consultative Councils are taking a great deal of interest in the work.

On the technical side, it is reported that all approved contractors included in the first edition of the Roll have now received their first routine inspection. A general improvement in the standard of work is being maintained. Since February, 1957, there have been 500 inspections of new applicants, including those deferred for a second inspection. In the same period there have been over 5,400 routine inspections and the gross total of installations inspected has reached over 15,000.

The majority of the Electricity Boards appear to be adopting the recommendations of the Joint Liaison Committee's report and this should lead to a more uniform standard of inspections and tests carried out by Electricity Board inspectors before the connection of new installations. It is noted that the degree to which Electricity Boards accept a moral obligation to inspect installation work not carried out by enrolled firms appears to vary considerably in certain parts of the country.

Publicity to encourage consumers to have their installations examined and tested periodically by approved contractors is recommended because these contractors are often asked to make additions to old and unsatisfactory installations.

All approved contractors have been acquainted with the Board's decision in the matter of the correct method of installing instantaneous water heaters. The chief technical officer has accepted an invitation to join the Earthing Sub-Committee of the I.E.E. Wiring Regulations Committee. A number of local authorities have been advised to obtain certificates relating to the wiring installations associated with petrol service pumps to the 1957 amended code from approved contractors. For large installations the Council has advised the authorities to refer to a consulting engineer.

Among the points included in the annual report of the Board for the year ended 31st March last are the resignation of Mr. C. R. King from the chairmanship and the election of Mr. A. F. Plummer to the position, with Mr. C. T. Melling as deputy chairman. Mr. Melling was nominated by the Electricity Council to succeed Sir Henry Self upon the latter's appointment as chairman of the Electricity Council. Mr. King has been nominated as representative on the National Inspection Board of the Central Electricity Generating Board and Messrs. A. N. Irens and H. V. Pugh as representatives of the Electricity Boards.

The Property Owners' Protection Association has declined membership of the Council and it has therefore been removed from the list of constituent bodies under the articles of association.

During the year 252 applications for enrolment were received; 136 applications were approved and 10 rejected; there were 95 resignations and removals from the Roll; 3,515 routine inspections were carried out (involving 8,000 installations); 3,511 contractors were included in the second edition of the Roll (May, 1958); and the number of names and addresses in the geographical section of the Roll was 5,096.

The total expenditure of £45,208 was met by contributions from the Electricity Boards and from enrolment fees and subscriptions. The budget figure was £47,900 to which was added £5,100 as a reserve for contingencies, making a total of £53,000. The same figure is the estimated expenditure for the current year.

Annual Meeting

Mr. A. F. Plummer presided at the annual meeting last Friday when the annual report and accounts were adopted. Afterwards there was an informal discussion. Mr. Plummer mentioned that the president of the I.E.E. and the chairman of the Wiring Regulations Committee were now members of the Board. Brigadier W. G. S. Thompson, chief executive officer and secretary, said that a series of meetings had been held in a number of the larger centres and invitations had been sent to employers, local authorities, the Electrical Association for Women, the National Farmers' Union and Chambers of Commerce. Useful guidance had been obtained from questions asked at these meetings. He regretted that there had been a poor response from architects and builders. It had been suggested to architects and builders that the contractors whom they employed should be on the Roll.

Mr. Forbes Jackson said that they were not getting over to builders the fact that the difference between the costs of sound and poor installations was infinitesimal.

Brigadier Thompson said that it was virtually impossible to assess the number of electrical contractors—real

and so-called. They reckoned that the Roll embraced about 55 per cent of the genuine contractors.

Commenting on a suggestion that installations should bear an indication of the contractors' names, Mr. Plummer pointed out that this was already required by the I.E.E. Regulations, although it was more honoured in the breach than in the observance. Mr. E. J. Sutton, the chief technical officer, said that a firm of nameplate manufacturers had been approached and had supplied about 50,000 labels to contractors.

At the subsequent annual luncheon Sir Henry Self spoke about the progress made in the enrolment of contractors and in securing the interest and support of those concerned in various ways with electrical installation work. It was necessary to make the Council's work more widely known to the general public on the lines of "Don't do it yourself, but employ an approved contractor." He was particularly glad to note the interest taken by the E.A.W. and hoped that the support of other women's organisations would be secured.

If the present progress was maintained it might be confidently expected that before many years passed the Council would be generally and nationally accepted as the recognised registration body.

Buried Distribution Transformers

TO solve the problem of finding new sites for transformers to reinforce existing supply networks a new type of buried distribution transformer was developed last year by Ferranti, Ltd., following discussions with the South of Scotland Electricity Board (see *Electrical Review*, 6th December, 1957). The company now announces that field trials carried out in Scotland over the past twelve months have proved conclusively that the unit can successfully withstand the most severe distribution loading conditions. The performance of the unit was assessed on both winter and summer loads. It is felt that this development is likely to lead to significant changes being made by supply authorities in dealing with load growth, particularly as capital costs can be substantially reduced.

The transformer, which has undergone the most rigorous tests in the Clyde area, is an air-cooled, 500 kVA, 11 kV/433 V, three-phase unit, utilising Class "C" insulation and being fully instrumented.

Other features of the transformer are that it requires no plinth, railing or expensive concealing structure, as it is contained in a strongly protected tank which can be buried directly in the ground, e.g. under a pavement or grass verge, with only a small ventilating pillar showing above the surface. Consequently, the problem of offending structures is completely surmounted.

It should also be borne in mind that as Class "C" materials are non-hygroscopic the danger resulting from damp air being drawn into the tank is removed. They are also non-inflammable. Moreover, the use of these insulating materials has reduced the size of the core and coils within reasonable limits. Although Class "C" insulated transformers are inherently expensive in construction, costs compare favourably with those involved in installing a standard conventional transformer in an outdoor substation.

Ventilating pillar of buried distribution transformer

The ventilating pillar which separates the incoming from the outgoing cooling air was designed on the lines of an overground dstribution pillar. As it is offset to one side of the tank the core and coils can be installed or removed without difficulty. This also has the added advantage that the pillar can be installed in a wall or hedge, while the main tank is buried beneath the pavement, verge or garden. In consequence, the only visible part of the unit can be made to blend unobtrusively into its surroundings. Careful design has also ensured that the pillar is fully weatherproof, whilst allowing free ventilation.

Protection against blockage of the ventilating system by stones or dirt being dropped in, either accidentally or deliberately, is also incorporated. Should the pillar be damaged in a road accident the operation of the transformer will be unaffected, as the pillar can be safely replaced or repaired without disconnecting the transformer. Construction of this particular unit was simplified as no tappings were required; however, the production of units with tapping links can also be undertaken, access being gained by a man-hole cover as in standard Post Office practice.

Since the transformer was installed daily readings have been taken on site. These have included kVA printometer readings; phase current measurement; outlet and inlet air duct temperatures; metal temperature at top of housing; air, soil and ambient temperatures. All tests carried out on the transformer to date indicate that it will be entirely satisfactory for use in supply networks; there will be no risk of discomfort or danger to the public; and it will be relatively maintenance free. The maximum kVA rating at present in operation is 500, but as operating experience is accumulated, this figure is likely to be increased to around 1,500 kVA.

Following the successful field trials, Ferranti, Ltd., have now received an order from the North of Scotland Hydro-Electric Board.

CHRISTMAS LECTURES

THE 129th course of six lectures adapted for a juvenile audience will be given at the Royal Institution, 21, Albemarle Street, London, W.1, on Tuesdays, Thursdays and Saturdays from 30th December to 10th January next at 3 p.m. The lectures will deal with some of the subjects being studied during the International Geophysical Year, including the ionosphere, geomagnetism, the upper atmosphere, meteorology, oceanography and the Antarctic.

INDUSTRIAL NEWS

Trade with Europe

With the French rejection last week of the concept of a Free Trade Area "as wished by Britain," there remains little hope that the Common Market and Free Trade Area can go forward together from 1st January, 1959, as was the original aim. However, the French objection, which up to now has shown itself in prevarication, has at last been brought into the open and it is possible that a concerted effort to find a solution to this fundamental problem will make it possible for the already protracted negotiations to be resumed with more hope of success. It is important to remember that the dispute is not, as is often implied, between Britain and France. The Free Trade Area is desired by all countries in the Organisation for European Economic Co-operation, apart from France, and there is a wide measure of agreement on the form it should take.

Though the Common Market countries will probably try to maintain a common front, recent statements have shown that Benelux, Germany and Italy are not a little concerned for their future trading position with other O.E.E.C. countries should they become isolated within a highly protectionist Common Market. On a broader front, failure to reach a satisfactory agreement could seriously endanger the economic and political future of Europe.

A more optimistic attitude towards trading with Europe has developed in British industry during the past year and it is to be hoped that the United Kingdom Government will make it clear that they cannot favour any discrimination in tariffs or quotas, which, as Mr. R. Maudling, who is in charge of the negotiations, has said, would be entirely opposed to the whole theory of the O.E.E.C.

Advice for Consumers

Domestic electrical appliances account for the largest number of inquiries from the public to the Advisory Council on Standards for Consumer Goods. In its annual report for 1957-58 the Council says that this is "as much because of their convenience and versatility as because of the safety factors involved." During the first six months of 1958 letters to the Council, on all subjects, requesting information averaged 400 a week and of these 60 a week contained complaints. The circulation of *Shopper's Guide* is now 50,000 an issue.

The Council urges the need for marking all electrical appliances that are safe, and deplores the slow progress of attempts to establish a national approval scheme. Ninety makes of electric blanket have now qualified for the kite mark.

In view of the growth in its responsibilities and interests the Council feels that it should be reconstituted as a separate legal entity. It has also asked that the whole matter of consumer representation should be the subject of a national inquiry, and it hopes that from this will emerge an independent national body representing every aspect of consumer interest and activity.

Large Swing Hammermill

The largest swing hammermill ever to be designed and built in Britain has been ordered from the General Electric Co., Ltd., by the Quarry of Adelaide Cement Co., Ltd., South Australia. Already under construction at the company's engineering works at Erith, Kent, it is a Dixie non-clog hammermill, 72in in diameter and 60in wide, weighing 70 tons. The main driving motor of 650 h.p. is being supplied by the G.E.C. electrical engineering works at Witton, Birmingham. Of fabricated steel construction, the hammermill will be used for crushing a sticky argillaceous limestone containing lumps up to 48in in size, at the rate of 350 tons per hour, breaking it all through 1in in one operation.

Export Credits for Engineering Goods

The Export Credits Guarantee Department has simplified arrangements for cover on those engineering goods commonly sold on credit terms ranging from six months to three years maximum, whatever the unit value of those goods, which are covered by "extended terms" endorsements or memoranda attached to the normal short-term cover. The normal short-term cover will continue to apply to raw materials and consumer goods. Hitherto the credit terms acceptable for insurance within this field have been decided for each application for cover on an individual transaction. The E.C.G.D. has now informed such policyholders that they can assume there will be no objection to credit terms up to two years maximum in respect of orders of £20,000 or more for either commercial credit users (such as distributors) or for end-user buyers; and that there will be no objection to terms up to three years maximum for orders of £50,000 or more for end-user buyers. Where the exporter seeks to give credit for longer periods than provided for above, it will be necessary for him to make an individual case to the E.C.G.D., which retains underwriting discretion as to the other elements of a contract.

Safety Colours Standard

Since the publication last year of B.S. 2929, the British Standard on "Safety Colours for Use in Industry," the attention of the British Standards Institution has been drawn to the fact that the use of a green cross, as recommended in the standard, to indicate first-aid goods and equipment might possibly be considered as an infringement of certain registered trade marks. To avoid any risk of confusion the standard is therefore being amended. It will now recommend that the position of first-aid equipment should be indicated by the use of the words "First Aid" printed in bold white capital letters on a green rectangular background.

Contract Price Formulæ

The British Electrical and Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 14th November is deemed to be 194s.

The "costs of materials" figures are: For electrical machinery and equipment the Board of Trade index figure published on 14th November is 179·3 (1949=100) and 115·5 (1954=100); both figures are provisional. For turbo-generating and allied plant: Materials used in mechanical engineering industries 186·7 (1949=100) and

Sir John Pickles (left) and Mr. J. S. Maclay inspecting equipment at the Glasgow Electro-Heat and Productivity Exhibition *(see page 947)*

124·2 (1954=100), blast furnaces and iron and steel melting and rolling (40 and 41) 190·7 (1949=100) and 129·9 (1954=100); figures are provisional. The price of ¾in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 14th November) is 48⅞d per lb.

"Split-Level" Houses

The first of 200 "split-level" houses which James Millar & Partners, Ltd., are to build on Glen Eyre housing estate at Bassett, Southampton, was opened recently by Lady Lewisham. The new house has been furnished as a show house and a wide range of domestic electrical equipment has been installed covering laundering equipment, heaters, clocks, cookers, vacuum cleaner, kettle and percolator.

Solartron Anglo-American Agreement

The Solartron Electronic Group, Ltd., has concluded selling and manufacturing licensing agreements for the "Kintel" range of electronic products of the Cohu Electronics, Inc., of San Diego, California, U.S.A., which covers the whole world, with the exception of Sweden and North and South America. The range of products includes d.c. digital voltmeter systems, data amplifiers, electronic galvanometers, digital readouts, electronic digital voltmeters, absolute d.c. power supplies, meter calibrators, d.c. voltage standards, strain gauge power supplies, microvoltmeters and ammeters, a.c. convertors, accelerometers, and vibration and sound pressure measurement equipment.

Floor Warming Installations

Smethwick Housing Committee has approved a plan submitted by the borough engineer providing for the erection of 23 three-bedroom dwellings in two five-storey blocks with electric floor heating installations on the Broadmoor House site.

Jackson Boilers New Factory

The new factory in Ellard Road, Leeds, of Jackson Boilers, Ltd., was opened on 31st October, and in the evening a dinner to celebrate the opening was held at the Hotel Metropole, Leeds. The new premises have enabled work at seven separate premises in Holbeck and East Street, Leeds, to be brought together under one roof. The floor area is 58,000 sq ft, and in addition to the various shops for the production of tea and coffee making machines, the new premises include shower baths, canteen, offices and a showroom displaying items from the company's range of products.

The fitting shop of the new Leeds factory of Jackson Boilers, Ltd.

Proposed American Merger

It is reported by the Sylvania Electric Products, Inc., that the boards of directors of the General Telephone Corporation and Sylvania have approved, in principle, of the merger of Sylvania and General Telephone. In connection with the proposed merger, the General Telephone board of directors is to recommend to its share owners a change in the name of that company to "General Telephone & Electronics Corporation." It is contemplated that Mr. D. C. Power (General Telephone) will become chairman of the board and chief executive officer of the parent company, and that Mr. D. G. Mitchell will become president.

Grimsby Dock Improvements

British Transport Docks announce that the West Quay of the Royal Dock, Grimsby, is to be modernised at a total estimated cost of £165,000. The work includes the provision of three new 7½/3-ton electric cranes in replacement of four hydraulic 3-ton units, and two 3-ton electric cranes will be transferred from the east side of the Dock.

Buried P.V.C. Unarmoured Cable

Siemens Edison Swan, Ltd., has supplied to the Midlands Electricity Board a quantity of insulated and sheathed low voltage cables for underground installation, the cables each having three sector shaped cores and a concentric copper conductor as the neutral. There is, as yet, no established practice governing the use of unarmoured cable in the ground. Consequently, for safety reasons, it is desirable to have a concentric type of cable, thus maintaining an outer metallic envelope for the live cores.

This unusual construction is likely to be used increasingly as protective multiple earthing is extended in rural areas. In this system the concentric copper conductor is earthed at the substation and on each consumer's premises, and would normally be protected over its whole length by a p.v.c. sheath.

The main incentive for the use of p.v.c. cables is lower overall installation costs because certain designs are cheaper than the corresponding paper cable.

This type of installation is little affected by the presence of moisture, there are no compound migration troubles, and the resultant cable has a reduced weight and greater flexibility. Further, it should be possible to dispense with the use of heating equipment during jointing, while the jointing techniques that can be adopted with this type of cable should simplify operation and further reduce the cost of the complete installation where supply engineers are prepared to dispense with heating equipment for jointing.

Fluorescent Lamp Developments

Improved production techniques controlling the electrical characteristics and external treatment of fluorescent tubes have been applied by Crompton Parkinson, Ltd., to the complete range of Crompton tubes, making them equally suitable for all switch and instant-start circuits, without the need for a metallised stripe. No extra charge is to be made for what is to be regarded as a standard feature. The extra cost that has applied to silicone coated tubes is, therefore, now abolished, as is the need to keep stocks of more than one type of tube for different circuits.

The price of 5ft 80 W instant-start fluorescent lamps of Philips Electrical, Ltd., have been reduced to that of switch-start lamps of the same rating. The manufacture of switch-start lamps in the 5ft 80 W size has been discontinued. The company's range of 4 W, 6 W and 8 W miniature fluorescent lamps has been extended by the addition of the 13 W 21in size. This rating is available in cool white and warm white and sells at a list price of 15s.

A single range of tubes for operation on all types of switch and switchless-start circuits with 200/250 V supplies has been announced by Atlas Lighting, Ltd., and Ekco-Ensign Electric, Ltd., all tubes being automatically "sylcoated" and tested to ensure striking on a 185 V supply. Tubes of all ratings and "white" colours are available, in lengths ranging from 18in to 8ft, at the same price as the previous standard tubes.

Lighting Showrooms

A new showroom for Rotaflex (Great Britain), Ltd., was opened recently at 4, Conduit Street, London, W.1. It had been designed by John and Sylvia Reid, architects, who are also responsible for many of the lighting fitting designs. The showroom is intended to show architects, designers and members of the public the wide range of lighting fittings, in both plastics and

W.D.R. Cologne studio showing the lighting bars and their supporting tube lattice

metals, made by the company. The walls and ceilings of the new premises are formed by panels which are locked into position by their own weight. These can be easily removed and new panels complete with fittings can be slipped into position and plugged into the electrical system within a short space of time. A large area at the back of the showroom has an elliptical plaster cupola which is intended for the display of larger multi-light fittings. To mark the opening a new type of lighting fitting, the "Cascade," has been introduced. The "Cascade 10" is a close cluster of ten slender perforated stainless steel cylinders, while another, the "Cascade 36," is a thirty-six light fitting of closely grouped perforated steel cylinders, half of them in black and the other half white.

British Equipment for German TV Studio

The lighting equipment for the first of a new block of television studios for West Deutscher Rundfunk in Cologne has been supplied by three British companies. The studio, of approximately 3,500 sq ft, has 40 motorised lighting bars in four rows of ten, each with four 2 kW socket-outlets. The electrical supply to the outlets is fed through a lattice of folding tubes which enable the bars to travel over 30ft without any loose flex. Each winch for raising and lowering the bars is self-contained with its motor, and is controlled from a central panel. Bars 8ft in length only are used enabling them to be dropped inside the scenery.

Three types of lantern are fitted, 1 kW open scoop or flood, 2 kW Fresnel spot, and 500 W Fresnel spot. The lighting circuits are taken to a dimmer room, which houses the current control equipment, and terminated in a patching panel with sockets fed through fuses from the three-phase supply. Dimmers and other controls are inserted as series connections in each socket, the jacks being of the double pole concentric type. The 62 dimmers are driven through electro-mechanical clutches from a single motor-driven shaft.

An organ type selector switch stop-key is fitted to the console for each control channel for selecting the required circuits. These keys are also linked to a memory storage system which enables combinations of them to be re-selected at any time by a series of 14 push-buttons. In addition, two duplicate sets of dimmer levers are incorporated which can be connected to the dimmer servo to control the circuits selected by the stop-keys.

The control and dimming equipment was manufactured and installed by the Strand Electric & Engineering Co., Ltd., the Fresnel spots, scoops, mike booms and camera cranes by Mole Richardson (England), Ltd., and the motorised winches and suspension equipment by Rae Stage Equipment, Ltd.

Nuclear Power Station Simulator for C.E.G.B.

Elliott Bros. (London), Ltd., a member of the Elliott-Automation Group, has been awarded a contract by the Central Electricity Generating Board for the design and manufacture of a nuclear power station simulator which will be used for training operators for the Berkeley and Bradwell power stations and for subsequent stations of similar type. It is to be installed at Berkeley in the middle of next year. The equipment consists, in effect, of a replica of the main control desk and will simulate not only the reactor itself but blowers, heat exchangers, etc. It will be able to reproduce abnormal working conditions, a facility which will be under the control of an instructor provided with a special panel out of sight of the trainee.

Cable Damage Action

At Rugby County Court recently the East Midlands Electricity Board sued the Ministry of Transport and Civil Aviation and a third party, Judkins (Coated Macadam), Ltd., for £373, the cost of repairing damage caused by the Ministry's contractors, Judkins, Ltd., to an underground cable.

It was stated that road widening near Lutterworth involved the removal of a high voltage cable and the laying of a new cable in a slightly different position. This work was carried out by manual labour in the summer of 1956. On 18th December a widespread electricity failure occurred which was traced to a section of the newly laid cable. The Board claimed that the cable had been damaged by the contractors in the excavation of the road. For the contractors, the site agent described the procedure followed and said that in the course of his visits to the site he never saw any evidence of the excavator's deviating from the route laid down for it, or of the drainage trenches—one of which went over the cable and one under it—being excavated other than by hand.

Judge Hamilton gave judgment for the plaintiffs for the amount claimed, and costs, and for the defendants against the third party, with costs. He said he was satisfied that the cable had been properly laid and was afterwards wrenched out of position by the mechanical excavator.

Maybridge Construction Co. Summoned

Last February questions were raised in the House of Commons about the operations of the Maybridge Construction Co. during a debate on London Electricity Board contracts. Last week summonses were served on the company and on Frank Hazlewood, a shareholder, John Richard Bovington, managing director, and Joseph Walter Woolley, secretary. Hazlewood is accused of offences under the Prevention of Corruption and the Forgery Acts and the others of aiding and abetting him. The summonses are returnable at Guildhall in December.

N.I.C. Inspecting Engineers

The National Inspection Council for Electrical Installation Contracting announces new addresses of two of its inspecting engineers. Mr. H. F. Smith is now at 592, Brunshaw Road, Worsthorne, nr. Burnley (telephone: Burnley 5201), and Mr. M. J. Pryor's address is 43, Downton Road, Rumney, Cardiff (telephone: Cardiff 77312).

Simmonds Aerocessories Export Sales Conference

Overseas visitors from thirteen European countries attended the annual export sales conference of Simmonds Aerocessories, Ltd., a member of the Firth Cleveland Group. The conference, which started at Treforest, Glamorgan, on 20th October, continued throughout the week and culminated on 24th October in a buffet dinner at the Waldorf Hotel, London, and a visit to "My Fair Lady" at the Theatre Royal, Drury Lane.

Pressed Steel Co.'s Acquisition

Refrigeration (Birmingham), Ltd., has been acquired by the Pressed Steel Co., Ltd., as from 31st October. Refrigeration (Birmingham), Ltd., has been in existence for over twenty-one years and since 1943 has held a franchise as distributors of "Prestcold" refrigeration equipment, which is manufactured and marketed by the Prestcold Division of the Pressed Steel Co., Ltd., and it will continue to

operate in this type of business. The arrangement covers the Amara Works of Refrigeration (Birmingham) at Bromford Lane and the new showrooms at Smithfield House, Digbeth. The company also has branches at Coventry, Leicester and Stoke-on-Trent and each of these is equipped with showrooms and service depots. Refrigeration (Birmingham) will continue to operate as at present under Mr. D. A. Field, managing director, and the other existing executives and staff.

Induction Heating Aids Biomechanics

The introduction of antibiotics and the development of anæsthetics have made possible the extensive surgery necessary to replace diseased parts of the bone in the human body, and considerable progress has already been made in the surgical treatment of leg bone diseases using metal implants made of cobalt-chrome-molybdenum alloy. A high-frequency induction furnace designed and supplied by the General Electric Co., Ltd., has been installed at King's College, London, to melt with minimum contamination small quantities of metals for fabricating experimental parts, and to produce alloys which will be tested for mechanical properties and biological compatibilities.

The furnace, which can melt 10 lb of metal in 20 minutes, incorporates a valve-operated generator giving an output of 7 kW at a frequency of 500 kc/s, housed in a steel dust-proof cabinet with a filtered cooling air intake. The h.f. power is supplied to a heating inductor mounted in a sheet metal cabinet at the front of the generator. The metal is placed in a refractory crucible which is moved in and out of the heating inductor by a ram, giving control by varying the coupling between the charge and the coil.

When a melt is in progress the mouth of the furnace is covered with a lid and a safety switch ensures that the power cannot be switched on unless the lid is in position. A small hole in the furnace lid enables the progress of a melt to be observed.

G.E.C. induction furnace for King's College

Strip Wound Cores

The RCL.193 range of "C" type cores produced by Telcon-Magnetic Cores, Ltd., Chapelhall, Lanarkshire, in grain oriented steel for transformers and other electromagnetic equipment has been augmented by the introduction of cores in which grinding and lapping the cut faces has reduced the length of the effective air gap, less magnetising VA now being required. At present these cores are produced in 0·013in material only, designed for operation at 50 c/s. The company has also introduced a range of "Y" type cores which have a balanced three-phase magnetic circuit, giving performance levels similar to those obtained under single-phase excitation when using "C" cores.

Institute of Industrial Supervisors

The Institute of Industrial Supervisors will have completed the first ten years of its existence on 27th November, and in its November issue of *The Supervisor* it records its achievements during the past decade.

Diary

From the Telegraph Construction & Maintenance Co., Ltd., we have received a copy of their handsome pocket diary for 1959. This contains information about the companies of the group and their directors and senior staff.

Geothermal Steam Turbine

The General Electric Co., Ltd., has received an order from the Tasman Pulp & Paper Co. of New Zealand for a turbo-generator which will use steam from a geothermal source. The contract, placed through the G.E.C.'s New Zealand organisation, the British General Electric Co., Ltd., is worth about £125,000.

The 10 MW turbo-generator set will use the geothermal steam at 100 p.s.i.g. D.S., and exhaust it at 1 p.s.i.g. from the back-pressure turbine. The use of geothermal steam in this way raises problems of erosion which require special consideration. Apart from this, the generator is a conventional 3,000 r.p.m. machine with closed circuit air cooling.

British Exhibit at Helsinki

A selection of diesel-electric generating plants made by Dale Electric (Yorkshire), Ltd., is being shown by a Finnish firm at the forthcoming Helsinki Trade Fair.

Shop Lighting

We have received a copy of a four-page publication named "The Lighting Specialist," produced by Courtney, Pope (Electrical), Ltd., Amhurst Park Works, Tottenham, London, N.15. It links up with the current shop lighting campaign of the British Lighting Council for its contents relate to the lighting of shops and stores—show windows, interiors, ceilings, etc. A number of illustrated articles deal with various aspects of the subject.

Commercial Travellers' Benevolent Institution

The annual general court of governors of the Commercial Travellers' Benevolent Institution will be held at the Café Royal, London, W.1, on 27th December.

Trade Announcements

The **British Thomson-Houston Export Co., Ltd.,** is now at 33, Grosvenor Place, London, S.W.1 (telephone: Belgravia 7011).

The offices of the **Metropolitan-Vickers Electrical Co., Ltd.,** at 1-3, St. Paul's Churchyard, London, E.C.4, will be moved on 24th November to 33, Grosvenor Place, London, S.W.1 (telephone: Belgravia 7011). The London district office and special contracts and traction sales departments of the **Metropolitan-Vickers Electrical Export Co., Ltd.,** will be moved to this address on 1st December.

The **Lightfoot Refrigeration Co., Ltd.,** Wembley, Middx., and Gesellschaft für Linde's Eismaschinen A.G. of Wiesbaden, Germany, have signed an agreement for mutual collaboration whereby the full range of products and technical resources of each company in the field of domestic and industrial refrigeration and air conditioning will be made available to the other.

Chamberlain Industries, Ltd., Staffa Works, Staffa Road, Leyton, E.10, has been appointed sole distributor throughout the United Kingdom for the Swiss-made "Rival" conduit-bending machine.

Robert Ritchie (Electrical), Ltd., 22, Mincing Lane, Blackburn, have been appointed sole distributors for Great Britain and Northern Ireland for Starkstrom Schaltgeratefabrik E. Spindler & O. Deissler, Gummersbach (Rhld), Western Germany, manufacturers of control gear.

Ford Wholesale Electric, Ltd., has moved its Hove branch to Newtown Road, Hove, 4 (telephone: Hove 71268).

Chilton Electric Products, Ltd., has appointed Mr. L. Cook, 20, Loxley Avenue, Shirley, Solihull, Warwickshire, as its representative for the Midlands area, and Mr. F. Holland, 22, St. Austell Drive, Heald Green, Cheadle, Ches., as north-western area representative.

Price Reductions

The K.A.M. unit, a development of the Kez-strip electrically-driven conveyor belt brush, manufactured by the Kleen-e-ze Brush Co., Ltd., Bristol, has been reduced in price by £15, irrespective of size or type.

PARLIAMENTARY REPORT

So that he can be in touch with the latest ideas about nuclear safety precautions, the Minister of Power is appointing a committee consisting of nuclear safety experts of the highest standing to advise him. Announcing this in the House of Lords last week, Lord Mills said that the Government regarded such a committee as being necessary, for the time being, because nuclear science and engineering were making rapid strides, and the attendant problems of safety were continually evolving with them. On the advice of the nuclear safety committee, the responsible Minister would be able to keep in touch with new ideas and put the necessary measures into effect through the inspectorate which was to be set up under the terms of the Nuclear Installations (Licensing and Insurance) Bill, the second reading of which he was moving. In making appointments to the committee the Government would consult, among others, the Atomic Energy Authority, manufacturers of nuclear plant, insurers, the owners and operators of major nuclear installations, and organised labour.

Lord Mills said the main purposes of the Bill were to provide safety control by licence, and absolute liability on the owner of a reactor of up to £5 million for injury or damage by radioactivity, with an obligation to take out proper insurance cover.

Lord Wilmot criticised the Bill because, he said, it contained surprising assumptions and was open to grave objection. Under the Atomic Energy Act, 1954, the A.E.A. and the electricity authorities and anyone operating under their wing were liable for causing injury or damage without any limit. So this Bill was not an extension of the provisions for public safety but a curtailment of them. Radioactivity risks were still the subject of much conjecture, but enough was known to show that they were almost limitless. If Lord Mills did not see any private operators coming forward and asking for licences, why introduce a Bill for that purpose before M.P.s knew what the Bill ought to contain? To pick on a limit of £5 million was completely unrealistic at a time when we could not conceive what the limits of damage would be. Claims in respect of injury and damage arising from a reactor accident would be allowed up to ten years from the date of the accident; yet the Medical Research Council had pointed out that the effects of over-radiation might be manifest only after twenty years.

Lord Merrivale thought the policy of concentrating on the gas-cooled, graphite moderated reactor had been right and was borne out by the United States proposals to have a similar type built. Our attitude had been governed by the fact that the object of our reactors was to produce electricity, and they had the advantage that faulty fuel elements could be changed while the power station was on full pressure and temperature.

Lord Shackleton was doubtful whether the £5 million limit for liability was adequate for all possibilities. It was by no means an excessive insurance against disaster which any large undertaking was liable to take out in any case. A reasonable increase up to £50 million would be a negligible insurance cost and would be readily accepted by the ordinary underwriting procedures.

Lord Mills, replying to the debate, said the Act which nationalised the electricity industry was intended not to make electricity undertakings departments of state, but to get them to operate as businesses. The Atomic Energy Act, 1954, made the A.E.A. completely and absolutely liable to an unlimited extent for the result of its operations. The House would not expect a business which had to balance its accounts, taking one year with another, to operate under such conditions and the Government considered it necessary to introduce this Bill so that the nationalised authorities, and private industry, if and when they came to build reactors (there was already the research reactor of Associated Electrical Industries, Ltd., at Aldermaston in operation) should be able to insure their risk and that Parliament should define what their liability should be. If there were a national disaster, the Bill provided that the question of compensation would come before Parliament. As for the period in which claims should be allowed, there had been careful inquiry and it was felt that ten years was a fair time.

The Bill was read the second time.

Farm Electricity Supplies

When the Agriculture (Small Farmers) Bill was given a second reading in the Commons several members stressed the need for electricity supplies to be provided as one of the improvements on small farms. Mr. T. W. Jones (Merioneth) said that the North Wales Electricity Board could boast that it had connected more farms during 1957-58 than any other Board in the United Kingdom but a great deal more needed to be done. The Minister would do a great service to farmers if he would persuade the Exchequer to allow a Board to know exactly how much it might spend for years in advance, so that there could be orderly planning.

Mr. William Whitelaw (Penrith and the Border) endorsed this appeal, saying that if the Minister could help to initiate a real drive to complete rural electrification he would be doing much to supplement the Bill.

Mr. H. R. Spence (West Aberdeenshire) said that in many parts of his constituency no electricity was available because the mains did not exist. "There are black islands of isolation where we cannot get electricity even when we want it," he said. Then there was the colossal increase in the installation charge and the supply charge, which in many cases was quite unrelated to the value of the farm and its rent.

Replying to the debate for the Government, Mr. J. B. Godber, Parliamentary Secretary, Ministry of Agriculture, said that many connections had been made to farms recently, but any help in relation to electricity supplies came under the provisions of the Farm Improvement Scheme rather than under the new scheme to be set up under this Bill.

Free Trade Area

The Prime Minister informed Mr. Chetwynd that the Government still attached the same importance as hitherto to a Free Trade Area as a complement to the European Economic Community. The negotiations were still proceeding, though serious differences of view persisted. The Government were in close touch with British industry and it was hoped that a satisfactory solution would be reached.

Mr. Gaitskell asked if a statement could be made indicating clearly the alternatives which would be forced upon the Government if the negotiations failed.

Mr. Macmillan said that at this stage in the negotiations the matters could best be represented privately.

Electricity Supply Failures

Mr. P. Smithers asked the Minister of Agriculture whether he was aware of the anxiety and expense caused to farmers in the Sparsholt, Littleton and Crawley areas by repeated failures of the electricity supply; and what steps he was taking to secure a supply of electricity adequate for the agricultural industry in this district.

Mr. Godber, Parliamentary Secretary, said he was not aware of these difficulties until a few days ago and he was sorry about them. The Minister of Agriculture could not intervene in the operations of Electricity Boards but he was calling the attention of the Minister of Power to the matter.

Lighting of Motorways

Replying to Sir Frank Medlicott, the Minister of Transport (Mr. Harold Watkinson) said he was not at present

satisfied that continuous lighting on motorways was required, but the lighting requirements for motorways in this country were being studied jointly with the Road Research Laboratory.

Development of Inventions

In the Development of Inventions Bill the Government proposes to extend for a further ten years the power of the Board of Trade to advance money to the National Research Development Corporation, and to increase the limit of advances which were fixed in 1948 at £5 million, to £10 million.

Membership of Area Boards

Mr. Arthur Palmer asked the Paymaster General if he would make a statement on the principles now being followed by him in the appointment of part-time members to Area Electricity and Gas Boards; how many employees working in the industry had been so appointed; and to what extent the proportion of part-time members from private industry had been increased in relation to local authority and general consumer interest.

Sir Ian Horobin said that by statute these appointments must be made from amongst persons having the proper capacity and experience. In deciding the best composition of these Boards the Minister desired to see a greater proportion of whole-time members by the inclusion of executives of the industries, and had recently made some such appointments in pursuance of this policy. It was not possible to classify Board members into rigid categories but there had been no significant change in the character of the part-time members during the last two years.

Transport Commission Finance

The Minister of Transport stated in the Commons last week that the Government was considering giving the British Railways additional capital for investment. Because of the unexpected fall in bulk traffic due to conditions in the coal and steel industries, the deficit of the British Transport Commission at the end of the year would be about £85 million, or about £20 million more than the deficit for 1957.

Capital Investment

Mr. Ernest Davies asked the Chancellor of the Exchequer what capital investment it was proposed to authorise for the roads programme, the nationalised electric power industry and the British Transport Commission, respectively, during the year 1959-60.

Mr. Erroll, Economic Secretary, Treasury, said it was intended in 1957 that the power and transport industries would invest more in 1959-60 than they did in 1957-58. During the summer these increases had been augmented, and further short-term additions were now being made. In total there would be a substantial increase over last year. (The Chancellor had said earlier between £125 million and £150 million.) But since the programmes were under continuous consideration he could not at this stage give precise figures for them individually.

Machine Tool Industry

Mr. Edelman asked the President of the Board of Trade whether he would take action to arrest the decline in the machine tool industry. Compared with last year, orders had fallen by £25 million in value, and employment had gone down by 6,000. Many of the leading machine tool manufacturers had taken to acting as agents for foreign manufacturers of the most advanced type of transfer machinery, thus further increasing unemployment in the British industry.

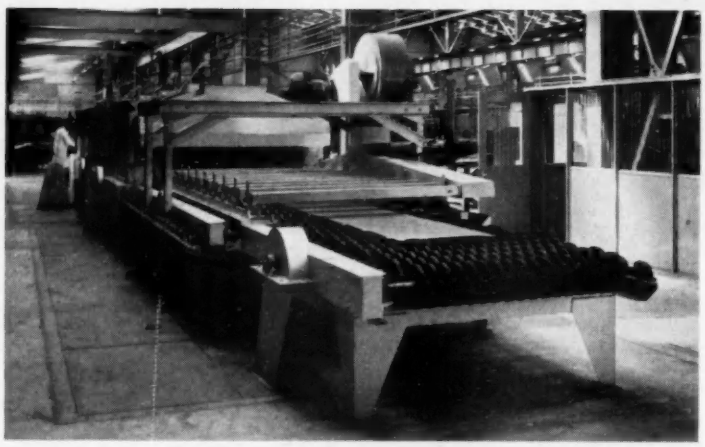
Sir David Eccles said that measures taken by the Government to stimulate industrial activity should help the industry and, in time, investment would pick up.

Titanium Annealing

An electric furnace designed and supplied by G.W.B. Furnaces, Ltd., Dudley, has been installed in the new I.C.I. Metals Division plant at Waunarlwydd, South Wales, for annealing titanium. Since the high cost of the metal makes a reduction in the amount of scrap produced important, flat sheets with a high degree of consistency in the quality of the anneal, and also of the oxide film on the surface, are required. To ensure that the sheets are as flat as possible on discharge, a disc roller-hearth design was chosen, comprising a series of shafts running across the full width of the furnace hearth with evenly spaced discs inter-meshing with those on adjacent shafts. The furnace has a maximum electrical rating of 195 kW, divided into four independently and automatically controlled sections, with an incoming supply to each section fed through a tapped transformer.

Titanium sheets in a large variety of sizes, ranging from 2 or 3ft widths with lengths up to 12ft and thicknesses from 0·02in to 0·2in, are dealt with, and the furnace is designed for an output of 600 lb per hour based on sheets 6ft by 3ft by 0·04in thick. In addition to initial, intermediate and final annealing of all grades of sheet 0·01-0·25in thick, the final annealing of 317 and 318A alloy sheet is also carried out. The operating temperature varies with the sheet quality, but is normally in the range 700 to 1,000 deg C.

Rollers in the 30ft long heated section of the furnace are of a suitable alloy to withstand the high temperatures involved, while those in the loading section and the 16ft extension from the discharge end, for forced air cooling and unloading the sheets, are rubber covered to reduce abrasion. The furnace roof is divided longitudinally into removable sections to give easy access for maintenance.



Titanium sheet being carried from the cooling section at the discharge end of the furnace on the disc rollers

INDUSTRIAL FILM FESTIVAL

Film entries for the second Industrial Film Festival to be held at Harrogate from 21st to 24th April next are invited from sponsors and all producers concerned with films for industrial purposes. A copy of the regulations and entry forms can be obtained from the secretary, 3, Portman Chambers, 7-9, Baker Street, London, W.1 (telephone: Welbeck 1104).

Cable Manufacture in Wales

Aberdare Factory Celebrates 21st Anniversary

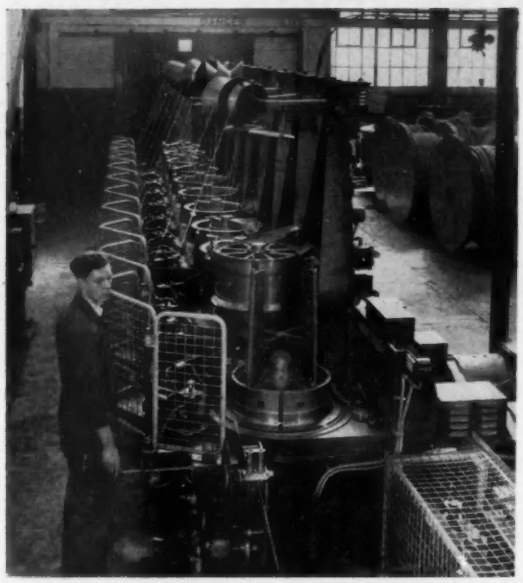
FOUNDED in 1937 during a period of recession and widespread unemployment, Aberdare Cables, Ltd., this year celebrate their 21st anniversary. It was decided to place the company, an entirely private venture, in South Wales to assist in relieving unemployment which had risen to some 45 per cent, and consequently it became one of the first industries outside coal and steel to go to the Welsh valleys. The buildings on the original 19 acre site were completed in 1938 with a total floor space of 63,000 sq ft. Two 360ft long and 75ft wide reinforced concrete bays were equipped with 10-ton travelling cranes and served with sidings from the main line railway, giving a basic layout which has survived successive expansions. Copper wire drawing was undertaken in addition to making power cables and the first order in March, 1938, was for 520 yd of overhead line conductor for the Aberdare Urban District Council. By the summer of 1939 the labour force had grown to 200, working three shifts fulfilling orders obtained from local electricity undertakings, all parts of Britain, and places as far afield as Iceland, Norway, Turkey, South Africa and Hong Kong.

During the war years a previously planned extension was completed by the Ministry of Supply, a new building being erected giving an additional 27,000 sq ft of floor space. Part of the factory switched from cables to armaments between 1941 and 1945, producing up to 15,000 shells per week for aircraft, tanks and field artillery, in addition to smoke bombs and mines and, later, a separate building was erected under Admiralty direction to make torpedoes. In 1941 a small firm in the Treforest Trading Estate was taken over to form South Wales Switchgear, and this has grown steadily, with new factories at Blackwood and Treforest. After the war much of the existing machinery was modernised and new plant installed, including a 3,500 ton lead press. Nearly half the factory's output was exported, to a steadily expanding market.

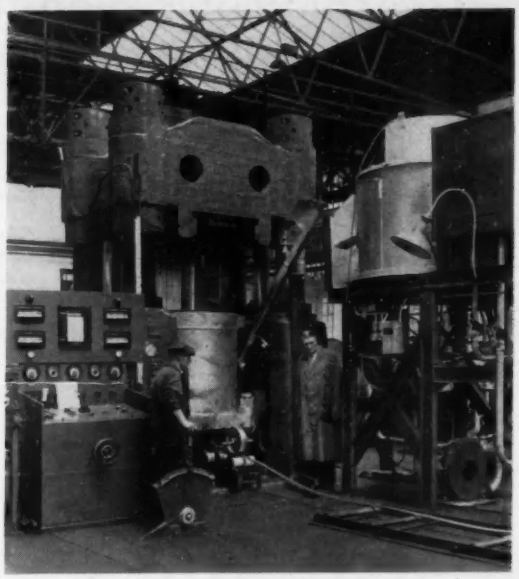
In 1953 manufacture of solid-type cable for 33 kV systems had begun, and in the following year the north bay was extended for new high-voltage testing equipment, an instrument room and enlarged test enclosure, while the chemistry and physics laboratories were moved to larger premises. More than 400 people are now employed, making a greater variety of cable than ever before, and further expansion is planned with the development of a 12 acre site acquired recently near the present factory.

Last week we visited the factory and saw the various manufacturing processes employed in cable production. In the wire drawing department multiple die machines are used for drawing electrolytic copper, an even wire tension being obtained by allowing the wire to slip on the driving drums. Wrought aluminium rod is drawn on non-slip machines in which each drawing head has an individual speed control with indication when slip occurs. Excess wire can be accommodated if successive heads are not exactly synchronised, and an accumulator head is incorporated at the output end permitting the take-up drum to be changed without stopping the drawing process. Circular and shaped stranded conductors are produced from the drawn wire, the shaping die rotating to impart a spiral to permit laying-up without strain. Hardwood dies are used where possible to prevent damage.

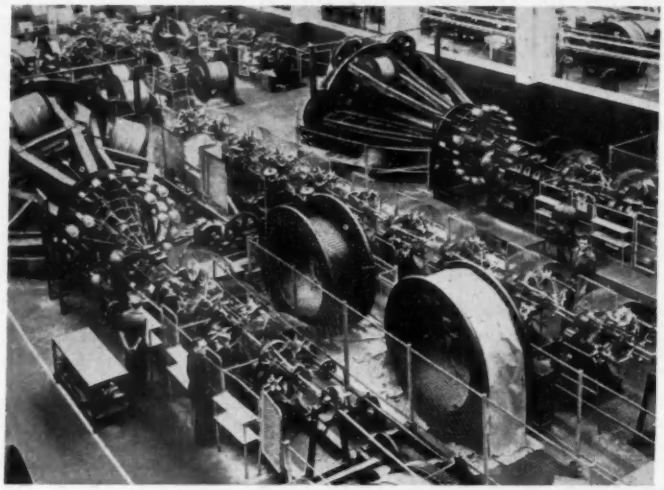
Eight paper insulating tapes are applied simultaneously



Aluminium wire drawing



The hydraulic press applying a lead sheath



Laying-up power cables

to the conductors at each head of the paper lapping machines, care being taken to ensure that they are applied at the correct tension, aligned with neighbouring turns to give a 70 per cent overlap. The cables are dried in hermetically sealed heated tanks evacuated by rotary vacuum pumps, the moisture being removed in a condensing chamber between the impregnating tank and pump. To prevent water contaminating the pump oil seals and reducing the degree of vacuum, a continuous supply of clean dry oil is circulated through to the seals, the spent oil passing through a centrifuge. Pressures lower than 0·1 mm of mercury are thus achieved.

The three impregnating units, comprising impregnating tanks, a compound storage vessel and transfer pumping equipment, contain a saturant suitable for low-voltage, e.h.v. or non-draining cables. The impregnating compounds consist of blended mineral oil and highly refined rosin, with small additions of micro-crystalline wax in the non-drawing compounds, to provide the required temperature-viscosity characteristic. The compound is filtered and degasified at regular intervals and samples are tested for dielectric loss angle, insulation resistance and moisture and rosin content. On removal from the impregnating tanks the cables are sheathed with a continuous extrusion of lead or lead alloy by hydraulically operated ram type lead presses with electrically heated and thermostatically controlled die boxes, the unsheathed cable entering the machine from a tank of impregnating compound to completely seal the dielectric and prevent moisture ingress. Steel tape or wire armouring with bitumen-impregnated textile beddings and servings is applied together with any special servings required.

Plastic insulated and sheathed cables are manufactured, ranging from multi-core polythene insulated and p.v.c. sheathed cables for telephone and control circuits to p.v.c. insulated power cables with shaped and prespiralled cores. Raw materials are tested in the laboratories before issue to the manufacturing departments and intermediate production control testing at various stages of the product, such as drawn wire, completed strand and stored compound, is carried out, in addition to tests on the completed cable. A self-contained mobile testing unit with a motor-driven alternator is used for fault finding and the testing of cables after installation.

Telecommunication Manufacturers' Dinner

LAST week the Telecommunication Engineering and Manufacturing Association held its annual dinner at the May Fair Hotel, London, under the chairmanship of Mr. E. T. Jackson. Proposing the toast of the Post Office Telephone Service, the chairman paid a tribute to its achievements during the past year despite Treasury cuts in the capital investment programme. The telephone industry considered that the Post Office had contributed more than its fair share towards the credit squeeze, he said. Having already provided £26 million out of income more than it raised in the previous year, so reducing by this amount its borrowings for capital investment, its estimates were further cut to the extent of £5-£10 million. The increased costs had resulted in the loss of many subscribers.

Study of the recent Post Office White Paper gave evidence of the vigorous forward planning which was being stifled by Treasury policy even though the Post Office showed a profit and was revenue-earning. The export of telecommunication apparatus, amounting to approximately £30 million, dependent on skill and "know-how" rather than imported material, relied for its increase largely on up-to-date Post Office technical experience which should not be thwarted by any postponement in development. As plans had to be made five years ahead, now was the time of the Treasury to encourage this expansion with a promise for the necessary capital investment. It seemed logical to encourage this capital investment which was more than self-supporting from the balance of payments point of view.

The response was made by Mr. Ernest Marples, the Postmaster General, who said that in the Post Office field the capital investment for the year 1959-60 and 1960-61 had not yet been settled and one could only speculate as to what would happen; for instance, during the current year £1½ million extra had already been allowed and this was an important cushion. Mr. Marples said that many of the things to which the chairman had referred had been in his mind for some time and he was hopeful about the prospects. It should be borne in mind, however, that there were a number of applicants for whatever extra funds for capital investment became available. Mr. Marples said that he had arranged for several executives in the Post Office to be exchanged with some in industry and he hoped this arrangement would result in some cross-fertilisation of ideas.

The T.E.M.A. awards for apprentices were then presented by the chairman to Messrs. A. Proudman, R. Hartshorn and R. M. Lane. Finally the toast to the guests was proposed by Mr. W. G. Patterson and a brief response was made by Lord Ebbisham.

MATERIALS HANDLING CONFERENCE

THE first International Conference of the Institute of Materials Handling will take place on 6th, 7th and 8th May, 1959, at the Waldorf Hotel, London, W.C.2. The conference theme will be "Material Benefits through Materials Handling" and in addition to lectures and discussions there will be a number of works visits.

PUBLIC WORKS EXHIBITION

ALTHOUGH there were fewer new machines than usual on show at the Public Works and Municipal Services Congress and Exhibition at Olympia, London, last week, many of the exhibits to be seen were of an improved design and included several items of electrical interest. Most of the equipment displayed, from small scientific instruments to massive earth-moving machines, are the products needed by contractors, civil engineers or municipal authorities and there could have been little doubt in the minds of visitors as to the important part that electricity plays in any kind of public works project. Hoists, cranes, conveyors, loaders, crushers, mixer vibrators and pumps are only a few of the items which are now commonly electrically driven.

On the C.A.V. stand there was shown a range of diesel fuel injection equipment and electrical equipment for contractors' plant, tractors, earth-moving machinery, and a variety of stationary and portable engines. Typical C.A.V. generators from 4½in diameter, for battery charging, starting, lighting or motor operation, were shown with suitable voltage regulators, while among starters from 4½ to 7in dia. were heavy duty types suitable for cranking diesel engines, and the model CA.45 coaxial starter of new design. Also to be seen was a selection of C.A.V. electric motors

Rawlplug "Vibroto" drilling machine

for hydraulic pumps and similar drives, all of which were totally enclosed and specially finished to withstand the effects of damp and tropical conditions.

Among the selection of mobile diesel-alternating sets on the Petbow stand, those of particular interest to public works contractors included a "Vulcan" mobile set with an output of 350 kW, powered by ganged Rolls-Royce eight cylinder turbo-charged engines. Auto Diesels, Ltd., exhibited both diesel and electrically driven pumps, including new 3in and 4in "Contractors" models and a new 2½ kW diesel generating set. Varying types of tractors fitted with Perkins diesel engines were also to be seen.

Among other companies exhibiting generating sets were R. A. Lister & Co., whose range includes the model TS.3 with an output of 47·5 kW; W. H. Dorman & Co.; Teles Smith, Ltd.; and Tarpen Engineering Co., Ltd. The last two firms also showed a range of electrically operated chain saws and hedge cutting tools.

A special feature in the lighting section of the Siemens Edison Swan stand was a display of Group B street lighting columns in Malayan or Kapur timber. These timber columns can be set directly into concrete without the need for a special base. Their density is 49 lb/cu ft and the ultimate stress is 18,700 lb/sq in. There were also several new wall mounting lanterns, for both Groups A and B lighting, including the "City of London" refractor bowl lantern, a vertical type which carries three 5ft 80 W tubes. The company also took the opportunity of demonstrating their internal telephone equipment, represented by their latest PAX.65 unit, which provides up to 25 lines.

Road traffic signs including guardposts and island sites, external lighting fittings, and the familiar "Keep Left" bollards were displayed on the stands of both Bergo, Ltd., and Gowshall, Ltd. A new fluorescent version of the "Exlite" external lighting fitting for road signs was shown for the first time by Franco Traffic Signs, Ltd.

Electric tools were well represented and the Rawlplug Co., Ltd., made a special feature of their new "Vibroto" drilling machine. It is composed of two main units, a portable electric drill and gear box and a vibrating head which is clamped to the motor unit. It can be adapted for light rapid or heavy slow vibrations or for continuous drilling. It measures 18½in in length and weighs 9 lb.

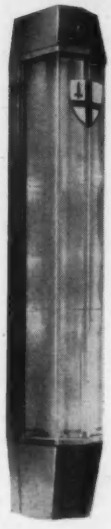
Kango Electric Hammers, Ltd., displayed their "H" type model, the latest addition to their range, which is claimed to be much larger and more powerful than previous types. One of the latest cartridge operated fixing tools at the exhibition was the Mark IV "Supadynamic" tool shown by F. H. Bourner & Co. Breech loading has been employed to speed up operation and cartridge ejection, although manual, is claimed to be quick. A new feature of this tool is the fitting of a silencer which reduces the detonating sound, enabling the tool to be used in circumstances in which it might otherwise be prohibited.

Of interest on the Department of Scientific and Industrial Research stand were specimens of road surfacings containing heating elements. These experimental electrically heated road sections are providing factual data on running costs. The elimination of icing at particular sites is not only a matter of convenience to road users, says the D.S.I.R., but when consideration is given to the costs of accidents and delays the provision of electrical heating may well prove to be an economical measure. The Key Engineering Co. carried out continuous demonstrations of the applications and advantages of conduit and pipes in fibre and also displayed their under-floor system based on a grid of fibre ducts.

Two companies were displaying the recently introduced parking meters, namely, Karpark Meters, Ltd., who showed both twin and single unit models, and Venner, Ltd. There was also a feature on the latter company's stand demonstrating the methods of servicing the "Park-O-Meters." These servicing tests, which were by means of portable electronic timing apparatus, recorded on a graph any loss or gain that might have occurred in the rate of the timing mechanism. A special display also showed examples of parking by means of a vehicle-operated parking gate in which a ticket dispenser is connected to the gate thus eliminating the need for an attendant.

Left: Siemens Ediswan 5ft "City of London" street lighting lantern

Right: Servicing a Venner "Park-O-Meter" using portable electronic apparatus to record any fractional loss or gain in the timing rate



GENERATION and DEVELOPMENT

Scottish 275 kV Line

The first double circuit transmission line to operate at 275 kV in Scotland was commissioned on 6th November. This line, which runs from Harker (near Carlisle) to Clyde's Mill (Cambuslang), has been operating at 132 kV since the end of 1954. It was constructed by the former British Electricity Authority and is connected to the supergrid system in England. The line will eventually form part of the new 275 kV supergrid system in the South of Scotland District, the construction of which has been approved by the South of Scotland Board. The new work involves the construction of 250 circuit miles of overhead line, the bulk of which is to be completed in 1963 at a total cost of some £9 million.

The new supergrid system will permit large quantities of electricity to be transmitted between widely separated parts of the South of Scotland Board's District and the line to England could be used in an emergency for the transfer of 360 MW.

New Primary Substation

The Eastern Electricity Board's new primary substation at Broughton, near Aylesbury, to meet the increasing demands for electricity in the district and to cater for the anticipated needs arising from the Aylesbury Town Development Plan, was officially commissioned recently by the Mayor of Aylesbury (Councillor Mrs. Zena A. P. Williams, J.P.), who was presented by Mr. S. F. C. Whitmore, manager of the Chilterns Sub-Area, with an "authority" to operate the necessary switch. Among those present were Mr. H. V. Pugh, chairman of the Board, and Mr. W. N. C. Clinch, controller of the Eastern Division, Central Electricity Generating Board.

The substation marks the completion of the initial stage of a large scheme of development which will increase the bulk supply from 55 to 155 MW and was built jointly by the Eastern Division and the Eastern Board. The approximate total cost of the substation, including the associated transmission lines from Sundon, is £337,500.

The distribution network radiating from Exchange Street, Aylesbury, has already been augmented by new 33 kV lines and major 33/11 kV substations at Tring and Ilmer. Similar substations will shortly be built at Buckingham Road, Aylesbury, Westcott and Bradenham.

Mr. J. B. Masson, commercial assistant, North of Scotland Hydro-Electric Board (second from right), discussing the floor warming equipment at a recent space heating exhibition held by the Board at Inverness. Others in the photograph (left to right) are Provost R. Wotherspoon, Inverness; Councillor A. MacPherson-Rait, Glasgow; Mr. J. Blackburn, burgh architect, Inverness; and Mr. J. Cameron, town clerk, Inverness

Restoration of Irish Subsidy

Moving the second stage of the Electricity (Supply) (Amendment) Bill in the Dail recently, Mr. Lemass, Minister for Industry and Commerce, announced it was proposed to reintroduce a 50 per cent Government subsidy for rural electrification as from 1st April next. He said that the purpose of the Bill was to make miscellaneous amendments to the Electricity Supply Acts, 1927 to 1955, the Liffey Reservoir Act, 1936, and the Shannon Fisheries Act, 1935. The effect of Section 2 would be to raise the limit of expenditure on rural electrification from £25 million to £30 million. At 31st March last the Electricity Supply Board had spent, or was committed to spend, £23 million. At that date 184 rural areas still remained to be developed and it was hoped that the entire scheme would be effectively completed by 31st March, 1962, at a cost of not more than £30 million.

Last year the Board had a net deficit of £180,017 on general account and £552,197 on the rural electrification account, he said. Charges arising from the bringing into operation of new generating stations in the last few years had reduced the Board's annual surplus, and the demands of rural electrification had meant the difference between a modest surplus and a loss. With the connection of new rural areas the average return on capital was falling sharply and the annual deficit on rural accounts when the scheme was completed would, in the absence of a subsidy, be well over £1 million. The Board had been increasingly perturbed by the growing rural deficits.

On the fisheries, Mr. Lemass said it was now clear that hydro-electric development involved such severe damage that the rehabilitation of the river fisheries, assuming it was possible, would be a long and costly process. He proposed at a later stage to introduce a provision designed to permit the Board to incur expenditure on the development of new fisheries in the reservoirs of hydro-electric schemes.

In the course of the debate Mr. Cosgrave spoke of the remarkable success of the Board which, he said, was a striking tribute to the vision of those who had conceived it. Mr. Norton thought the Board should be given power to supply water services in rural areas, and perhaps sanitation as well, saying it would be a pity if the entire organisation that had been created for rural electrification were disbanded.

Consent Withheld

The Minister of Power has decided against allowing the Southern Electricity Board to connect its substations at West Grafton and Pewsey by an overhead line through the Vale of Pewsey, where there are already two grid lines and an 11 kV line. A public inquiry was recently held into the scheme.

Fatal Accident at Northfleet

The collapse of scaffolding at the Central Electricity Generating Board's new power station under construction at Northfleet, Kent, last week resulted in the death of four steel erectors. Another man received serious injuries. The men were working 50ft up in the turbine house and fell to the reinforced concrete floor.

"Manweb" Progress Report

In the half-year to 30th September last the Merseyside and North Wales Electricity Board made new connections totalling 11,179, as against 14,909 in the corresponding period of last year. Within that period 1,636 consumers were changed from d.c. to a.c. and a.c. supplies to 981 consumers were converted to the standard 240 V.

New schemes have been approved for work which is estimated to cost £2,429,000, £1,022,000 for providing new and increased supplies and £1,407,000 for network reinforcements.

With the reduction in purchase tax and the relaxation of controls on hire purchase, appliance sales have risen considerably compared with the corre-

sponding half of last year, the total value of sales being £1,057,229, compared with £959,800, an increase of 10 per cent. (The increase in the number of appliances sold was, of course, considerably greater, as the reduction in purchase tax reduced the price of the appliances.)

Line Across Open Space

Thornaby-on-Tees Town Council and the county planning officer have approved, for a limited period of five years, the erection of an overhead line across The Green, Thornaby, to supply electricity to the Whitehouse Farm estate. Originally the North Eastern Electricity Board was asked to use an alternative route to prevent interfering with an open space, but its efforts over a period of months to obtain wayleaves for a different route were unsuccessful. After five years the position will be reviewed.

Heating Conference

Architects from the Manchester area, together with representatives of local authorities, electrical and building contractors and consulting electrical and heating engineers, attended a five-day heating conference and exhibition promoted by the North Western Electricity Board in Manchester from 20th to 24th October. The conference was arranged to explain the advantages of off-peak electrical heating systems. An exhibition held in conjunction with the conference illustrated various methods of off-peak heating and displayed photographs of industrial, commercial and domestic applications in various premises in the Board's area.

Electric Cooker Sales

In referring to Area Boards' September sales of electrical appliances in last week's issue, the comparative figure for August in the case of cookers was incorrectly given. The number sold in that month was 18,765.

Preservation of Cooling Tower Timbers

A film shown recently at the London Building Centre illustrated an interesting new process by which the natural decay of mist eliminator timbers is considerably retarded, thus achieving significant economies in the operation of cooling systems in power stations and similar plants. The new technique has been evolved by Richardson & Starling, Ltd., and was first applied by the firm to cooling towers at the Croydon "B" generating station during April and May this year.

The new process takes advantage of the action of soft rot microfungi, which render the outer regions of affected wood extremely absorbent and permeable and thus provide reservoirs for preservative chemicals. In practice, it is generally found that mist eliminators become suitable for treatment when they have been in service for at least two years, since at this stage the necessary degree of incipient rot has usually developed.

Applying the first stage of the double-diffusion treatment to mist eliminator timbers in a cooling tower at Croydon "B" power station

Treatment is commenced some hours after shut-down of the tower, as soon as the moisture content of the timbers is found to have fallen to a suitable level. The baffles are first sprayed with a predetermined quantity of a water-soluble preservative such as copper sulphate, which is left to diffuse inward and then fixed in the wood by a second spray application of salts of chromium.

In spraying, considerable care is required to avoid over-saturation of the timbers, since any dripping of chemicals on to the lower parts of the towers might cause contamination of pond water with consequent damage to the cooling system machinery.

OVERSEAS

More Power for Sydney

A six-point plan to provide Sydney with new sources of electricity supply by 1968 was announced this month by the chairman of the Electricity Commission. The plan was revealed in the Electricity Commission's exhibit at the Australian Planning Exhibition held in Sydney Town Hall. Mr. Conde said that by 1968 big blocks of electricity would be transmitted to Sydney from power stations operating economically on the coalfields north, west and south of Sydney, as well as hydro-electricity from the Snowy Mountains.

This would mean that three high-voltage substations would have to be built on the outskirts of Sydney to transform power received at 330 kV. Sites for these projects had already been selected near Galston, Wallgrove and south of Bankstown. New substations operating at 132 kV would be built at eleven points. A new system control headquarters would be established at Carlingford to supervise distribution on the Commission's grid system. Mr. Conde added that, to provide better communications within the Commission's network, a chain of 150ft high microwave towers would be built linking main transmission terminals. Some towers had already been erected.

Water Power in Ceylon

After extensive surveys the Department for the Development of Hydro-Electric Power, which has been set up within the Department of Electrical Undertakings, Ceylon, has reported that there is a vast power potential and has detailed the areas which can be profitably developed. At the Victoria Falls on the Mahaveli Ganga a 350ft dam could be built and plant installed to produce 50 million kWh a year (25 million kWh at times of extreme drought). Such a project would stimulate further development of the Mahaveli Ganga basin. The Walawe Ganga-Kaltota multi-purpose project in South Ceylon would be predominantly for irrigation purposes but could produce around 20 million kWh a year. The annual power potential of the Uma Oya River is estimated at 50 million kWh. Both the Irrigation and Electrical Departments have agreed to investigate this further. Extensive field explorations are required for the Kotmale Oya-St. Clair Falls project in central Ceylon. Hydrological reports indicate that the headworks should be installed in a highly developed tea-growing area.

Development of the Ratnapura-Kalu Ganga scheme would mean power generation when dry season shortages exist elsewhere, and would greatly contribute to free the towns of Ratnapura and Kalutara and the settlements in between from annually recurring flood disasters. This project would require the flooding of 45 square miles, including one town, numerous villages and several thousand acres of paddy fields, tea and rubber plantations and also some twenty miles of road. The estimated power potential is 35 million kWh a year.

From the Randenigala-Mahaveli Ganga scheme some 75 million kWh a year could be produced and a large area of land developed for cultivation by irrigation.

Nigerian Electrical Development

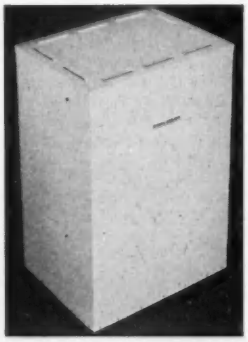
From Lagos, Barclays Bank D.C.O. reports that the sales of electrical energy by the Electricity Corporation of Nigeria for the six months ended 30th September amounted to 116·7 million kWh, producing an income of £1,795,000. Figures for the corresponding period of last year were 90·7 million kWh and £1,449,000 income.

The Bank also reports that the Nigerian Government is investigating the possibility of building a dam near Jebba to generate electricity, improve navigation on the River Niger and provide irrigation.

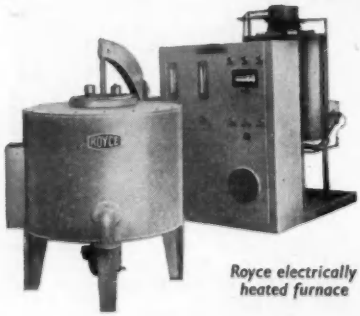
NEW ELECTRICAL EQUIPMENT

"Dagenite" 12 V battery

Nife switch tripping battery and charging unit



"Drial-Major" drying cabinet (B-J & W. Automation, Ltd.)



Royce electrically heated furnace

"Dagenite" Battery

The Type 6EF7-GZ 12 V battery added to the "Dagenite" range by HOLSUN BATTERIES, LTD., 137, Victoria Street, London, S.W.1, is designed specifically for fitting in the latest Fiat cars. Assembled in a hard rubber container measuring 9$\frac{5}{16}$in long by 5$\frac{1}{16}$in wide by 7$\frac{7}{8}$in high, the battery has flush inter-cell connectors, Porvic separators and small tapered Continental type terminal pillars, giving a total weight of 28 lb. The battery, which has a capacity of 32 Ah at the 20-hour discharge rate, is priced at £7 13s 6d including acid.

Switch Tripping Equipment

Each of the range of self-contained steelclad switch tripping units introduced by NIFE BATTERIES, Redditch, Worcestershire, includes a battery of the nickel cadmium alkaline type arranged in a single tier. The cabinets are of folded steel construction and incorporate a sloping control panel fitted with rectangular 3in scale flush mounted meters. The charge ammeter has a dual scale to read low and high rate charges. One high and four low charging rates controlled by fixed resistances can be selected by rotary switches. A warning lamp gives a visual indication when high rate charging is taking place. A compartment is provided beneath the battery for storing tools and accessories.

Drying Cabinet

An electrically heated multi-purpose drying cabinet suitable for clothes drying and airing, dish drying, food warming and even room heating is now being produced by B-J & W. AUTOMATION, LTD., 9, Curnock Street, London, N.W.1. Known as the "Drial-Major," it has a forced draught from a small induction motor driven propeller rotor in a miniature wind tunnel. The air is drawn in through a circular hole in the side of the cabinet, is forced over the heating elements, and then through the clothes, drying an average-sized wash in about 30 minutes.

The heating unit consists of three 600 W elements and two switches enable one or more elements to be on at a time, with or without forced draught. The cabinet is constructed of rust-proofed steel, stove enamelled in cream or white, and it measures 36in high by 24in wide by 18in deep. The drying rods are of anodised aluminium and the interior tray is of non-rust welded wire. The lid louvres are so placed as to allow the lid to be used as a useful working surface and the cabinet can be moved on its four ball bearing castors when not required. The price of the "Drial-Major" is £20 13s 4d plus £4 10s 8d purchase tax.

Under-Carpet Heater

A floor heating material in the form of element wires embedded in a thin flexible glass laminate with good insulating properties, designed to operate under a carpet or other floor covering, has been announced by MARTINDILL, LTD., 14, Finsen Road, Camberwell, London, S.E.5. The heater is available in a variety of sizes and ratings, from a 1 kW unit with dimensions of 9ft by 6ft, to 3 kW at 12ft by 12ft, with prices ranging from £10 16s 6d to £30 19s 5d. Room thermostats for temperature control are available at an extra £1 15s each.

Electrical Carburising Furnace

An electrically heated gas carburising furnace for small scale production and laboratory research in gas carburising before large scale production runs has been developed by ROYCE ELECTRIC FURNACES, LTD., Sir Richard's Bridge, Walton-on-Thames, Surrey.

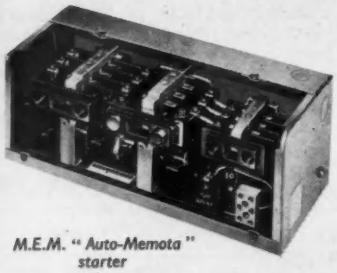
Rated at 18 kW nominally, the furnace has a 12in high work space with a diameter of 10in and is suitable for a maximum temperature of 1,050 deg C. Heating elements of 80/20 nickel-chromium in coil form are housed in open groove tiles in the side walls surrounding a gas-tight steel retort giving an even temperature transference. A heat resisting steel fan unit is fitted within the base of the retort giving a rapid circulation of the carburising gas, ensuring both uniform case depth and temperature distribution. The plug lid is fitted with a hand-operated power jack and swivel mast, and when closed a sealing lip engages in an annular seal in the gas-tight retort. Vents are provided to give accelerated cooling when required.

The equipment is supplied with fully automatic temperature control and a hydrocarbon injector unit, or, where consumption demands, a complete enriched-gas generator.

Automatic Star-Delta Starters

A range of push-button operated star-delta starters for 3-10 h.p. motors, incorporating a three-contactor switching circuit and a two-speed thermal change-over relay, has been introduced by the MIDLAND ELECTRIC MANUFACTURING CO., LTD., Reddings Lane, Tyseley, Birmingham, 11.

Each pole has a double break action and silver main contact studs are fitted throughout. Indirectly heated



M.E.M. "Auto-Memota" starter

bimetallic overload trips are fitted on each phase, an adjustable load indicator is incorporated, and visual indication is given in the "run" position. The unit is enclosed in a light sheet steel case, rustproofed and finished in stove grey enamel, and adequate knockouts are provided for cable entry.

"Auto-Memota" starters are available rated for 4-15 A at 200-440 V 50 c/s, priced at £10 16s each, with hand resetting for thermostat, float or pressure switch control at £1 extra.

In-line Coupler

HELLERMANN, LTD., Crawley, Sussex, have introduced a compact lightweight water- and pressure-proof electrical connector for individual cables with plug and socket pins crimped on to the conductor and held firmly by rubber under compression.

Fluorescent Lighting Ballast Unit

A ballast unit for fluorescent lighting has been announced by the MIDLAND COIL WINDING CO., LTD., 4, Lancaster Street, Birmingham. It has a bitumen free choke, capacitors and a transformer or switch mounted on a tray fitted with a pressed steel cover. The low weight, accessible components and transformer tappings to accept 200/210, 230/240 and 240/250 V supplies assist installation, whilst the accessibility of components and the provision of a replacement tubular glass fuse unit simplify fault finding and correction. The unit, which is available in either switch- or transformer-start versions, measures 16in by 3in by 3in and weighs only 8½ lb. The 80 W unit is priced at £3 12s arranged for switch starting and £4 6s for transformer starting.

Vibration Strain Gauges

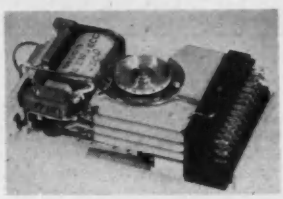
Two vibration strain gauges made from TCL Grade 3 piezo-electric ceramic, having a wide temperature range and flat temperature coefficient, are announced by TECHNICAL CERAMICS, LTD., Wood Burcote Way, Towcester, Northamptonshire.

The expansion gauge consists of a strip of ceramic, silvered and polarised across the thickness dimension, with foil leads, and the deflection gauge comprises a sandwich of thin ceramic and brass foil responding to a bending movement, an output of over 1 V being obtained with a deflection of 0·001in.

These gauges can be supplied with a high capacitance permitting analysis of low frequency vibrations. Additionally the gauges may be used to generate vibrations in a structure by applying an alternating voltage to the transducer. At resonance a considerable displacement of the structure is obtained with a very low power input to the element, and the transducers are so small that they do not materially affect the vibrational characteristics of the structure.

Miniature Uniselector

A small plug-in uniselector switch with 36 outlets for use in 22 V or 50 V systems is introduced by SIEMENS EDISON SWAN, LTD., 155, Charing Cross Road, London, W.C.2. The complete switch, weighing only 12 oz and measuring 3¼in by 2 5/16in by 1 5/32in, comprises three main elements: a driving mechanism and wiper assembly, a bank of contacts over which the wipers search at 60 steps per second, and a jack which is prewired and assembled to the mounting



Siemens Edison Swan miniature uniselector

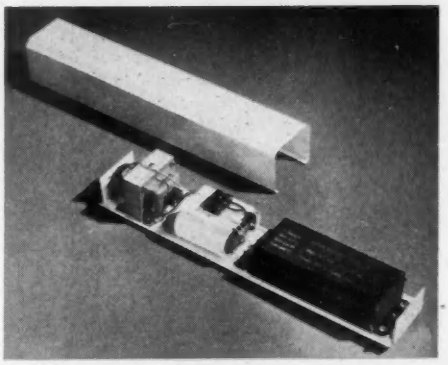
enabling the uniselector mechanism to be withdrawn without disturbing any wiring.

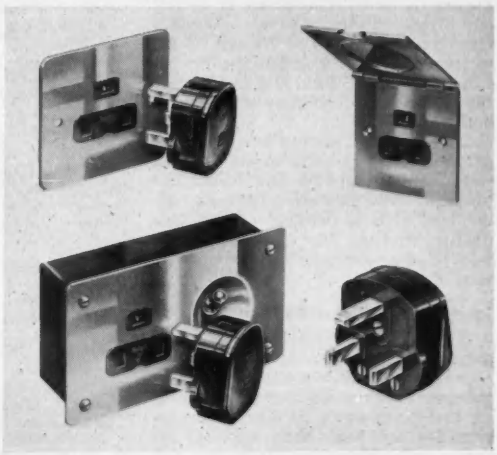
A ratchet and pawl system of the reverse drive type having a single driving magnet and a single break action interrupter spring set with tungsten contacts drives the wiper assembly consisting of three pairs of nickel silver treble-ended wipers of either the bridging or non-bridging type. The contact bank embodies 36 segments arranged in three levels, so arranged that one of the arms of the wiper assembly is always touching a solid contact segment, no feeder springs being required. All wiring terminations to both the driving mechanism and the contact bank are made by means of the 42-point plug and jack.

Off-Standard 13 A Accessories

The latest addition to the range of off-standard or "Walsall" gauge plugs and sockets manufactured by WALSALL CONDUITS, LTD., Excelsior Works, West Bromwich, is a selection of 13 A switched and unswitched socket-outlets and plug tops. Particularly suitable for industrial use, hospitals, colleges, etc., their use prevents low voltage or in any way off-standard appliances from being plugged into the usual main supply or, vice versa, standard appliances from being plugged into off-standard supplies. The plugs are available in standard colours (black finish at extra cost), unfused, single-pole or double-pole, in 2, 5, 10 or 13 A capacities.

Fluorescent lighting ballast unit by the Midland Coil Winding Co., Ltd.





Right: Selection of Walsall Conduits off-standard 13 A accessories

Financial Section

STOCKS and SHARES

BUYING of industrial shares in the Stock Exchange has been continued on a considerable scale, but has encountered a good deal of profit-taking sales. The result has been a measure of irregularity in price movements, with some issues making further advances to their best levels of the year, and others coming back a little from their recent best. Weakness in the gilt-edged market has become rather more pronounced. Commentators put it down to the scope of the Government's measures to revive trade through the loosening of credit restrictions and in other ways. Not only has this policy added lustre to the attractions of ordinary shares, but it seems also to have given rise to some apprehension over a possible revival of inflationary pressures.

A.E.I. and Henley's

More than 90 per cent of the shareholders of W. T. Henley's Telegraph Works accepted the offer of an exchange into Associated Electrical Industries £1 shares. The A.E.I. shares issued in that connection will rank equally for all future dividends. At a price of 57s 6d, and on the basis of the 15 per cent total distribution for 1957, the prospective yield is approximately 5¼ per cent. This operation virtually terminates dealings in Henley's shares, which have been for a great many years one of the best known investments in the electrical market.

Price Changes

Among the electrical shares moving up to new high points during the past week were Decca "A" at 33s, Aberdare at 14s 3d, Bulpitts at 10s 3d, Heatrae at 7s 6d, Holophane at 15s 6d and Strand Electric at 9s 3d. Aerialite recovered sharply to 8s 6d and others to improve included Ericssons, British Aluminium, and Ward and Goldstone; the last-named company is to give voting rights to its "A" shares. On the other tack, shares to lose a part of previous large gains included Hoover, G.E.C., Westinghouse and Metal Industries. Vactric were quoted ex- the dividend of 8s 6d per share, free of tax, distributed from the proceeds of the sale of the company's hire-purchase subsidiary.

Joseph Lucas Results

If the Joseph Lucas (Industries) dividend declaration for the year to last July came below the more optimistic of previous estimates, the figures in the preliminary profits statement were all that had been expected of them, and after some fluctuation the £1 shares were firmly maintained subsequently at around 43s 9d. The final dividend makes a total for 1957–58 of 7½ per cent, but the addition of a special interim payment of 2½ per cent on account of 1958–59 (presumably with the new scale of profits tax in view) brings it up effectively to 10 per cent. For the previous year there was a 7½ per cent dividend and a special tax-free payment of 1½ per cent. With the net profit up by over half a

Price Changes in

Company or Board	Nom. Value	Middle price 17th Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield%	1958 Highest	1958 Lowest
						£ s d		
Gilt-edged Stocks								
Brit. Elec. 1968/73	100	76	−½	3	3	3 19 0	76½	72
Brit. Elec. 1974/77	100	73	−½	3	3	4 2 3	73½	68½
Brit. Elec. 1976/79	100	76½	−½	3½	3½	4 11 3	78½	72
Brit. Elec. 1974/79	100	86½	−½	4½	4½	4 18 3	87½	82½
Overseas Electric Supply								
Calcutta Elec.	£1	17/-		6·8†	7†	8 4 3†	17/6	15/-
East African Power	£1	22/9		7½	8	7 0 3	23/-	17/6
Nigerian Elec.	£1	14/6		10	10	13 16 0	17/-	12/6
Perak Hydro-Elec.	£1	14/-		12½	10	14 5 9	15/6	13/6
Electrical Shares								
Aberdare Holdings	5/-	14/3	+9d	17½	17½	6 2 9	14/3	9/9
Aerialite	1/-	8/6x.d.	+9d	51½	54	6 7 3	8/6	5/1
Allen, W. H.	£1	43/9		10	11	5 0 6	43/9	32/9
Anglo-Portuguese Tel.	£1	26/3x.r.		8	8	6 17 3	29/3	19/9
Aron Elec. Ord.	£1	61/3		15	15	4 18 0	61/3	53/-
Assoc. Elec. Ord.	£1	57/6	+1/3	15	15	5 4 3	57/6	46/6
Automatic Tel. & El.	£1	72/6		17	17	4 13 9	72/6	57/-
Babcock & Wilcox	£1	53/9		15	13‡	4 16 9	54/6	41/9
Bakelite	10/-	21/3	−1/3	15	15	7 1 3	23/-	17/6
Baldwin, H. J.	2/-	3/-		20	20	—	3/9	2/6
Barry's Electric	5/-	10/6		10	10	4 15 3	10/6	5/9
Bowthorpe Holdings	2/-	11/-		37½	25*	4 11 0	11/-	6/6
British Aluminium	£1	61/3	+2/9	12	12	3 18 6	61/3	37/-
Brit. Elec. Traction: Def. Ord. "A"	5/-	38/6	+6d	25	25	3 5 0	40/-	19/6
B.I. Callender's	£1	51/6	+6d	12½	12½	4 17 0	52/-	38/9
B.I. Callender's 6% Pref.	£1	20/-		6	6	6 0 0	20/3	19/-
British Tabulating	£1	60/-	+3/9	9	10	3 6 9	60/-	38/6
British Thermostat	5/-	34/9		25	30	4 6 3	35/3	19/9
British Vac. Cleaner	5/-	4/6		10	10	5 11 0*	4/6	2/3
Brook Motors	10/-	43/9		25	25	—	43/9	27/9
Bulgin, A. F.	1/-	7/-		40	45	6 8 6	7/-	4/7
Bulpitts	5/-	10/3	+3d	—	12½‡	6 2 0	10/3	7/3
Burco Dean	5/-	11/3	+6d	20	22½	6 13 3*	10/9	7/9
Cable & Wireless: Ord.	5/-	13/-		10	10‡*	3 17 0	13/-	8/-
4% Loan	100	94½	+½	4	4	4 4 9	94½	89
Chloride El. Storage "A"	£1	65/-		17½	17½	5 7 9	66/3	55/6
Clarke Chapman	£1	64/3		27½	27½	4 5 6	72/6	55/-
Cole, E. K.	5/-	17/-	−6d	17½	17½	5 3 0	18/-	15/3
Cossor, A. C.	5/-	5/3		2½	Nil	Nil	6/-	4/4
Crabtree	10/-	31/6x.d.		20	20	6 7 0	32/-	24/4
Crompton Parkinson	5/-	12/6		16	12*	4 16 0	13/6	8/3
De La Rue	10/-	31/6	+6d	35	17½*	5 11 0	31/6	20/9
Decca "A"	4/-	33/-	+6d	43½	43½	5 6 0	33/-	21/3
Desoutter	5/-	16/6		32½	18½*	5 13 9	16/6	13/6
Dewhurst	2/-	8/9		16½	20	4 11 6	9/-	6/9
Dictograph Tel.	2/-	7/3		20	20	5 10 3	7/3	4/7
Dubilier Condenser	1/-	3/6		30	20*	5 14 3	4/3	3/1
Duport	5/-	10/9		25	25	5 16 3*	10/9	7/9
E.M.I.	10/-	53/6	−6d	15	15	—	54/-	27/6
Electrical Components	5/-	9/3		12½	12½	6 15 3	9/9	7/-
Elec. Construction	£1	28/9		8½	8½	5 18 3	28/9	21/-
Elliott-Automation	5/-	19/6		—	10‡	2 11 3	19/9	11/6
Enfield Cable Ord.	£1	17/-		Nil	2½	2 18 9	18/9	10/9
English Electric	£1	57/6		14	14	4 17 3	60/-	44/-
English Electric 3½% Pref.	£1	12/6		3½	3½	6 0 0	12/6	11/9
Ericsson Tel.	5/-	25/3	+6d	22†	12·9†	4 3 0	25/3	17/6
Ever Ready	5/-	21/9	−3d	37½	20*	4 12 0	22/-	13/9
Falk Stadelmann	£1	43/9		17½	15	6 17 3	46/3	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

million, a 10 per cent distribution is calculated to be covered 3½ times over by the surplus available. A yield of not much more than 4½ per cent on the shares reflects this substantial cover and also, no doubt, the persistence of high output figures from the motor industry.

Company News

British Insulated Callender's Cables shares remained firm at 51s 6d after the issue of the interim progress report. This disclosed that in the first half of the current year the surplus on trading had been little changed, and indicated that group results for the full year were unlikely to differ materially from last year's. The interim dividend is repeated at the previous rate of 4 per cent. Trading profits of Plessey for the twelve months ended last June came out 9 per cent below those of 1956–57, but there remains a comfortable margin for the maintenance of the dividend at a total of 30 per cent. Quoted lower subsequently at 67s 6d, the 10s shares yield nearly 4½ per cent. British Tabulating Machine £1 shares moved up to 60s following the preliminary statement of results. The distribution of 10 per cent is at the same rate as before but is on larger capital and is accompanied by a tax-free " jubilee " payment of 2 per cent.

Pifco Dividend

A final dividend declared recently by Pifco (Holdings) made for the year ended in April a total of 20 per cent, or 5 per cent more than the rate indicated in the prospectus at the time of the marketing of the shares in the early part of last year. The 4s ordinary shares have risen since the announcement to 14s 6d. A group profit of £198,000 (before tax) is slightly above the previous figure, and the dividend leaves nine-tenths of the net surplus to go back into the business. It is the directors' intention to maintain a conservative financial policy while there remains outstanding a substantial part of the cash consideration paid for the original acquisition of the business. The yield on the shares works out at 5½ per cent.

Crompton Parkinson Outlook

Crompton Parkinson's last financial year, ended in June, covered the most severe phase of the credit squeeze, but ended nevertheless with an improvement in the group profit and a moderate increase in the dividend to 12 per cent. In his review accompanying the full report, Mr. Albert Parkinson mentions that the distribution has been unchanged for five years, and that an increase is justified by the steady progress of the business. Regarding the outlook, he refers to sharper competition and continued pressure on profit margins, but reports a generally good order book and is confident of the ability of the organisation to meet the challenges of these conditions. Quoted at 12s 6d, the company's 5s shares pay a little over 4¾ per cent on the money.

Electrical Investments

Company or Board	Nom. Value	Middle price 17th Nov.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1958 Highest	1958 Lowest
Electrical Shares—continued								
G.E.C. Ord.	£1	36/3	−2/-	12½	10	5 10 3	40/-	29/3
G.E.C. 6½% Pref.	£1	21/6		6½	6½	6 1 0	21/6	20/3
General Cables	5/-	9/9	−6d	30	24	—	11/9	8/3
Greenwood & Batley	£1	52/6		17½	20	7 12 6	52/6	45/-
Hackbridge Holdings	5/-	13/9	−6d	20	20	7 5 6	14/9	7/6
Hackbridge & Hewittic	5/-	14/-		20	20	7 2 9	14/6	9/7
Head Wrightson	5/-	24/6		22½	17½*	3 11 6	26/-	16/9
Heatrae	2/-	7/6	+3d	15	20	5 6 9	7/6	4/-
Holophane	5/-	15/6	+6d	37½	22½*	7 5 3	15/6	12/6
Hoover	5/-	53/-	−6d	50	50	4 14 3	53/6	31/-
I.C.I.	£1	35/9	+3d	10	12	4 9 6*	36/-	23/9
Intl. Combustion	5/-	28/-	−3d	22½	25	4 9 3	28/3	19/3
Johnson & Phillips	£1	20/-		10	5	5 0 0	25/-	15/-
Lancashire Dynamo	£1	41/3	+1/3	11	11	5 6 9	41/3	28/6
Laurence Scott	5/-	16/9		15	15	4 9 6	16/9	12/6
Lister, R. A.	£1	31/6		10	10	6 7 0	31/6	23/-
London Elec. Wire	£1	63/9		12½	12½	3 18 6	64/6	39/6
Lucas, J.	£1	43/9x.d.	+2/-	7½	10‡	4 11 6	45/-	27/9
Marconi Marine	£1	38/9	+1/3	10	10	5 3 3	38/9	29/-
Marryat & Scott	2/-	7/6		35	37½	5 0 0*	7/7	5/3
Mather & Platt	£1	50/-		15	15	4 0 0*	50/-	29/6
Metal Industries	£1	42/6	−1/-	9	14	6 11 9	44/-	22/9
Midland Elec. Mfg.	£1	60/-		12½	12½	—	60/-	44/-
Morphy-Richards	4/-	18/9		20	20	4 5 3	19/-	14/6
Murex	£1	52/6	−1/3	20	17½	6 14 0	59/3	48/-
Newman Ind.	2/-	2/9		10	10	7 5 6	2/9	2/3
Oldham & Son	1/-	3/-		17½	17½	5 16 9	3/-	2/3
Parsons, C. A.	£1	55/-		8½	7½*	2 14 6	55/-	43/-
Plessey	10/-	67/6	−2/6	30	30	4 9 0	72/6	55/-
Pye	5/-	17/-		12½	12½	3 13 6	17/-	10/-
Pyrotenax	5/-	33/9	+2/6	—	27½‡	4 1 6	33/9	27/6
Reyrolle	£1	88/9		17½	17½	3 19 0	88/9	73/6
Rheostatic	4/-	7/6		12½	12½	6 13 3	8/-	6/-
Richardsons Westgarth	10/-	14/9	−6d	16¾	8½*	5 13 0	15/9	13/-
Scottish Cables	4/-	11/9		27½	27½	5 8 9*	11/9	7/-
Simon-Carves	5/-	30/-		20	25	4 3 3	30/-	22/6
Smith (England), S.	4/-	11/-x.d.	−1/-	20	12½*‡	4 11 0	12/3	7/-
Southern Areas	£1	12/6		7½	Nil	Nil	13/9	9/3
Strand Elec.	5/-	9/3	+6d	15	15	8 2 3	9/3	4/9
Sturtevant	5/-	19/-	−6d	15†	15†	6 17 6	19/6	14/9
Sun Elec.	£1	60/-		25	25	8 6 9	60/-	47/3
Switchgear & Cowans	5/-	8/9		25	22½	6 8 6*	8/9	4/6
Taylor Tunnicliff	5/-	17/3		15	17½	5 1 6	17/3	11/9
T.C.C.	10/-	37/6		25	25	6 13 3	38/6	32/6
T.C. & M.	£1	28/9		8½	8½‡	5 18 3	30/-	20/-
Telephone Mfg.	5/-	5/6		10	10	9 1 9	5/9	4/6
Telephone Rentals	5/-	12/9	+3d	12½	12½	4 18 0	13/6	9/9
Thompson (John)	5/-	25/-	−1/-	25	25	5 0 0	27/-	23/-
Thorn Elec. " A "	5/-	23/3	+3d	17½	17½	3 15 3	23/3	17/-
Thornycroft	£1	23/9		12½	7½	6 6 3	30/9	21/-
Tube Investments	£1	75/6	+1/-	15	17½	4 12 9	75/6	48/3
Vactric	5/-	26/3x.d.		25	25	—	—	—
Veritys	5/-	5/3		12½	2½	2 7 6	6/9	5/3
Walsall Conduits	4/-	17/9	+6d	20	22½	5 1 6	17/9	11/-
Ward & Goldstone	5/-	34/6	+1/6	40	25*	3 12 6	34/6	23/6
Watford	2/-	7/6		25	25	5 6 9*	7/6	4/-
Westinghouse	£1	42/9	−1/-	18	10*	4 13 6	43/9	32/3
West, Allen	5/-	12/6	+3d	15	12½*	—	12/3	7/9
Wolf Electric	5/-	8/3		20	10*	6 1 3	9/-	6/9

Tin Plate Workers' Scholarships

The Court of the Worshipful Company of Tin Plate Workers has again decided to offer up to twelve travelling scholarships, each to the value of £50, on the same terms and conditions as last year.

REPORTS and DIVIDENDS

Crompton Parkinson, Ltd.—The report and accounts for the year to 30th June last, now issued, confirm the preliminary figures given in our issue of 7th November.

In his review of the year, which has been circulated with the report, Mr. A. Parkinson (chairman) says that the year opened with active conditions overshadowed by an inflationary financial crisis and within a short period they were confronted by severe credit restriction and the raising of interest rates to an almost unprecedented height. The year closed with business activity in the country at a generally reduced level, although with many signs of the freeing of money and credit to provide financial stimulation for investment and purchasing. Throughout the year there was a steady intensification of competition culminating in conditions which in many ways now closely resemble those of pre-war years. The consolidated profit and loss account reveals another successful year.

Dealing with the group's overseas activities, Mr. Parkinson says that the works at Campbelltown, N.S.W., Australia, is in operation and in addition to the manufacture of f.h.p. motors it is now responsible for the manufacture of part of the range of "Security" control gear. This product was formerly manufactured at the Mascot Works which during the year had been closed and sold. B. & S. Electrical, Ltd., which manufactures switchgear at Alexandria, N.S.W., has had a satisfactory year and the original works at Five Dock, Sydney, remains in full activity and the transfer of certain manufacturing capacity to Campbelltown has allowed them to carry out some reorganisation at that factory. The Australian market has become distinctly more competitive. The jointly owned selling company, Noyes (Australia) Pty., Ltd., has been fully exercised in meeting this situation.

In India the jointly owned company, Crompton Parkinson (Works) Private, Ltd., has had another successful year. Whilst the demand for many of their products such as motors and ceiling fans remains high, there is evidence of a slackening of business and an increase in competition in the market for small transformers. Both the Indian selling companies have enjoyed profitable trading conditions. The problems in Canada have not been reduced and competition remains intense and the level of production of the Brantford factory is insufficient for its proper and profitable operation.

They are now engaged in manufacturing and supplying to Rustyfa, Ltd., a consortium which is to supply a complete motor tyre factory to the U.S.S.R., in which they are interested, their share of the first contract which that company has received, and the consortium is widening its activities to meet demands for its services from countries other than Russia.

Mr. Parkinson refers to the creation during the year of three new wholly owned subsidiary companies—Crompton Parkinson (Chelmsford), Ltd., Crompton Parkinson (Doncaster), Ltd., and Crompton Parkinson (Stud Welding), Ltd., which have respectively taken over the ownership and management of the Chelmsford Works, the Doncaster Works and the Stud Welding Division. The general effect of these changes is that all manufacturing functions are now carried on by subsidiary companies and nearly all the sales functions by the parent company. The factory extensions at Chelmsford and Derby have been completed and are now in production, and at Derby they have also built and opened during the year a new canteen and social centre. At the Guiseley Works of F. & A. Parkinson, Ltd., they have completed the development of an improved range of industrial electric motors. These machines are now in production and set new standards of performance in their field. The Victoria Works of Cooke & Ferguson, Ltd., Manchester, has been replanned and re-equipped and is fully tooled for the efficient production of medium and high voltage switchgear. Its capacity has been increased and it has a substantial order book. The Saxon Works have been closed down and in due course will be sold, the output from these works having been absorbed by the Victoria Works. The stud welding organisation has been fully occupied during the year and they have added to the range a welding gun of a new and smaller type which will considerably widen the application of the stud welding process. Atomic Power Constructions, Ltd., of which the company is a founder member, has continued to expand its resources during the year.

The order book improved during the past year and is generally good. They appear, however, to have entered an era of sharpened competition and can expect a continuing narrowing of profit margins which may be intensified as they are obliged to absorb rising costs. They would not have done so well during the past year but for the fall in some raw material prices.

Tube Investments, Ltd.—The financial results for the year ended 31st July last were given in our issue of 10th October.

In his circulated statement, which has been issued to shareholders, Sir Ivan Stedeford (chairman) says that the results for the year under review were again a record. Difficulties were not lacking at home and overseas, but the broad basis of their activities stood them in good stead. The future has its familiar undertone of uncertainty and so prospects for the current year are difficult to assess. At present a number of divisions look ahead with lower order books. Referring to Reynolds T.I. Aluminium, Ltd., in which they and the Reynolds Metals Co. of America each hold a 50 per cent interest, Sir Ivan says that the first twelve months' experience of working in double harness has been very satisfactory.

Dealing with the activities of the various divisions of the group, Sir Ivan states that the electrical division had another excellent year. The Simplex Electric Co. achieved record output and profits, and this occurred in a period when total home sales by the industry of cookers, spin dryers and water heaters, its main products, were not high and, at times, were even the reverse. The Creda "Debonair" spin dryer has fulfilled their hopes. It claimed at least 80 per cent of the home market. They look forward to similar results from the latest electric cooker, the Creda "Mercury," which was recently launched upon the market. Conditions in the cable industry continued difficult, but notwithstanding narrow margins, Mersey Cable Works improved its results. The Power Centre Co. has now occupied its new premises, which should enable it better to develop the demand for its system of cable trunking. Gowshall, Ltd., seized its opportunities to expand sales of street and road signs.

A notable feature of the period was T.I.'s growing contribution to the nuclear engineering industry. Ten years of research and development is beginning to show a return. The electric resistance welded steel tubing has absorbed much of the business which in earlier days was met by seamless tubes. They have recently put into commission a mill of their own design and make which they believe to be the biggest and most versatile of its kind so far installed in this country. Another good year was enjoyed by most of the dozen companies in the engineering and general divisions, and despite the credit squeeze sales generally advanced well with the emphasis on the heavier type of plant. Important export contracts completed during the period included orders from the United States, Russia, India, Brazil, British Guiana and South Africa. They covered such widely differing equipment as Sendzimer strip mills, complete non-ferrous rolling mill plant, wire drawing plant, mechanical conveyors, large slab milling machines, aluminium foil rolling mills and mills for rolling the rarer metals for nuclear engineering.

The year for the iron and steel division began with order books more or less full. Later on, however, the malaise, which has since infected the world steel industry, spread their way, and they finished the year working well below capacity. Sales, nevertheless, just exceeded those of the previous year. The two new electric

furnaces at Round Oak Steel Works are now completed and there is every indication that they will provide economies in operating cost, and that this significant step forward to electric melting of mild steels will be well justified.

Dealing with the group's overseas activities, Sir Ivan says that an agreement was reached during the year between their subsidiary, the Simplex Electric Co. (S.A.) Pty., Ltd., and the South African company of W. T. Henley's Telegraph Works Co., Ltd., to merge on a 50/50 basis. Their company, renamed Henley-Simplex Africa (Pty.), Ltd., has taken over the assets and operations of these two South African companies. Additional products will be manufactured, and extensions to the works at Springs are now being carried out. They have also acquired the Technical Construction Co. (Pty.), Ltd., of Springs, which is engaged in welded fabrications.

With regard to exports, it might have been expected that the recessions and other economic difficulties in overseas markets, together with the intensified competition, would have been reflected in the volume of direct exports. This, however, did not happen. Reinforcement was given to the overseas sales efforts, and although prices plumbed the lower levels, they maintained their share. The steel tube division, in fact, set a new record.

Sir Ivan concludes his review with references to the European Free Trade Area, developments at the T.I. Research Laboratory at Hinxton Hall, near Cambridge, the technological centre at Walsall, and to the new residential training centre in Edgbaston, Birmingham.

Johnson & Phillips, Ltd., in a circular to shareholders, state that the steps taken to improve the administrative and productive efficiency referred to in the chairman's statement included with the annual report and accounts for 1957 have become effective. Although the turnover for the first nine months of this year is somewhat lower than for the corresponding period of 1957, the profit in the home manufacturing departments, other than the Scottish subsidiary, British National Electrics, Ltd., shows an improvement. It is expected that this improvement will continue. Shareholders have been informed that the directors intended to reduce progressively the company's stake in the domestic appliance field. Production of appliances has now practically ceased in the British National Electrics, Ltd., factory and production of the remaining and more profitable products has been transferred to other factories of the company. The heavy losses incurred by this subsidiary will cease this year and during 1959 a modest profit should be earned.

The reorganisation of the arrangements for conducting the overseas business continues and everything possible is being done to offset the growing difficulties of exporting to traditional markets by expanding the overseas factories and by making increased efforts in other territories. Recent Government announcements of the lifting of restrictions on capital expenditure by the nationalised industries are expected to have beneficial effect on the company's input of orders and recent general relaxations in the credit squeeze should have a similar effect. The directors expect to be able to recommend the payment of a dividend of 5 per cent on the ordinary shares in respect of the current year's trading.

British Insulated Callender's Cables, Ltd.—The half-yearly statement issued, covering the period to 30th June last, shows group sales of £53 million, as compared with £58 million for the corresponding period of 1957. It is stated that the physical volume of group sales has shown some increase, but due to the lower prices ruling, particularly for copper, there has been some decrease in monetary values as compared with the overall position for 1957. Surplus on trading is £3,971,000 (against £3,880,000), and after making provision for all charges, including taxation, the net profit is £1,113,000 (£1,271,000), of which £1,088,000 (£1,184,000) is attributable to the holding company. The interim dividend on the ordinary capital is maintained at 4 per cent.

Competition for business both at home and overseas has been even keener than last year, but the adverse effects have been offset by increased efficiency and the more stable conditions experienced in the copper market. For the parent company and several subsidiaries the benefits of these last two factors have resulted in an increase in profits, largely cancelled out by some disappointing overseas results, particularly those of the Canadian Co., which, like other concerns in North America, has felt the full brunt of the recession there during the period under review. Some improvement in the North American position is already apparent. On the basis of present information the directors are of the opinion that overall group results for the year 1958 will not differ materially from those for 1957.

The Plessey Co., Ltd.—The accounts for the year to 30th June last show a trading profit of £1,350,110, as compared with £1,486,722 for 1956-57, which with treasury bills interest of £41,526, makes £1,391,636. Taxation absorbs £867,900 and the net balance is £523,736 (against £672,542). General reserve receives £250,000, and the ordinary dividend for the year is maintained at 30 per cent, with a final payment of 15 per cent. The balance carried forward is £1,257,331 (against £1,180,558 brought in).

Holophane, Ltd.—The annual meeting was held on 13th November, Dr. S. English (chairman) presiding. The directors' report, circulated to shareholders, stated that the credit squeeze resulted in the curtailment of some of the capital expenditure programmes for projects from which orders were expected and this, coupled with the more severe import restrictions applied overseas, which have affected exports, caused the volume of business handled to be rather less than the previous year's figure. As operating expenses continued to rise and the prices of the products were maintained, a reduction in the trading profit resulted.

W. T. Henley's Telegraph Works Co., Ltd., is making a special distribution of 3d per 10s stock unit (free of tax) as foreshadowed when the proposed acquisition of the company by Associated Electrical Industries, Ltd., was announced.

Ward & Goldstone, Ltd., are paying an interim dividend of 7½ per cent (unchanged).

Richard Johnson & Nephew, Ltd., have declared an interim dividend of 2½ per cent (unchanged).

Thos. De La Rue & Co., Ltd., are paying an interim dividend of 5 per cent (against 10 per cent) on doubled capital.

Pye (Ireland), Ltd., has announced an interim dividend of 2 per cent (unchanged) on larger capital.

Richardsons, Westgarth & Co., Ltd., have declared an interim dividend of 3¼ per cent (against 6½ per cent) on doubled capital.

Liquidations

Bromley Electrical Services, Ltd., radio, television and electrical retailers, 85-87, Lewisham High Street, London, S.E.13.—Winding up. Liquidator, Mr. A. W. Hunter, Walter House, 418-422, Strand, London, W.C.2, appointed 10th October.

Spherical Valves, Ltd., electrical engineers and manufacturers, 415-417, Oxford Street, London, W.1.—Winding up voluntarily. Liquidator, Mr. P. R. Robinson, 30, Queen Anne Street, London, W.1, appointed 3rd November. Particulars of claims to the liquidator by 30th November. This notice is purely formal. All known creditors have been, or will be, paid in full.

Avery Godsall, Ltd., electrical, radio and television sales and service, 50, Worcester Road, Bromsgrove, Worcs.—Winding up voluntarily. Liquidator, Mr. R. F. Bendall, 126, Colmore Row, Birmingham, appointed 28th October. Particulars of claims to the liquidator by 10th December.

Bankruptcies

E. V. Williams, 5, Clevedon Passage, Stoke Newington, London, N.16, electrician.—Receiving order made 31st October on debtor's own petition. First meeting 26th November and public examination 9th December at Bankruptcy Buildings, Carey Street, London, W.C.2.

M. Neidle, 26, Elmer Gardens, Edgware, Middx., lately trading as electrical contractor.—Receiving order made 6th November on debtor's own petition.

C. T. Pratt, lately carrying on business at 396, Essex Road, London, N.1, manufacturer of hardware and electrical fittings.—Receiving order made 5th November on a creditor's petition.

E. Bowes, 3, Front Street, Langley Park, Durham, radio and electrical engineer.—Last day for receiving proofs for dividend 26th November. Trustee, Mr. F. P. Hunnan, 30-32, Grey Street, Newcastle-upon-Tyne, 1.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2

1953

33263. Postmaster General.—Control units for switching systems. 25th November, 1954. (804691.)

1954

11608. Simplex Electric Co., Ltd.—Ovens. 22nd April, 1955. (804752.)

15587. Thompson Water Tube Boilers, Ltd., J.—Heat exchangers and tubes therefor. 24th November, 1954. (804592.)

21176. Stone & Co. (Deptford), Ltd., J.—Electrical supply systems. 18th October, 1955. (804711.)

25036. Simplex Electric Co., Ltd.—Electric light fittings. 29th August, 1955. (804601.)

25918. English Electric Co., Ltd.—Speed responsive switch actuating mechanisms. 5th September, 1955. (804644.)

33802. Montagu, J. D., and Chidzey, R. L.—Variable resistor. 15th November, 1955. (804731.)

34705. Metropolitan-Vickers Electrical Co., Ltd.—Velocity modulated electron discharge devices. 28th November, 1955. (804463.)

1955

7392. Yardney International Corporation.—Electric accumulators. 14th March, 1955. (804692.)

10662. Steatite Research Corporation.—Ferromagnetic ceramic materials with hysteresis loops of rectangular shape. 13th April, 1955. (804693.)

10940. Seismograph Service Corporation.—Radio location system. 15th April, 1955. (804605.)

13612. Allmanna Svenska Elektriska A.B.—Thermionic valve circuits. 11th May, 1955. (804607.)

18734. Norden-Ketay Corporation.—Means for phase discrimination of an a.c. signal. 29th June, 1955. (804734.)

21057. Ohio Crankshaft Co.—High frequency inductor arrangement for continuous seam welding. 20th July, 1955. (804633.)

221477. Eitel-McCullough, Inc.—Electron tube and socket therefor. 2nd August, 1955. (804572.)

24109. British Vacuum Cleaner & Engineering Co., Ltd.—Floor cleaning or polishing machines. 12th November, 1956. (804493.)

24715. United Kingdom Atomic Energy Authority.—Electromagnetic pumps. 24th August, 1956. (804621.)

24848. General Electric Co.—Piezo-electric transducers. 30th August, 1955. (804466.)

25223. National Research Development Corporation.—Magnetic recording systems. 24th August, 1956. (804735.)

28133. Saunders-Roe, Ltd.—Electrical wiring system. 3rd January, 1957. (804772.)

28302. Lancashire Dynamo Electronic Products, Ltd.—Electro-mechanical oscillators. 4th January, 1957. (804694.)

28374. Hawkins & Co., Ltd., L. G.—Automatic electrically heated apparatus for making beverages. 5th October, 1956. (804609.)

29321 and 29682. Stone & Co. (Deptford), Ltd., J.—Electrical supply systems. 4th and 18th October, 1956. (804712/3.)

31036. Denis Ferranti Meters, Ltd., and Reid-Jones, I. W.—Electromagnetic interrupters. 8th October, 1956. (804757.)

31598. Standard Telephones & Cables, Ltd. (International Telephone & Telegraph Corporation).—Means for reducing noise effects in television receivers. 27th August, 1957. (804471.)

34035. General Electric Co., Ltd.—Transistor oscillators. 30th October, 1956. (804472.)

34677. Stone & Co. (Deptford), Ltd., J.—Battery charging systems. 29th November, 1956. (804498.)

37124. British Thomson-Houston Co., Ltd.—Induction-heating apparatus. 17th January, 1957. (804716.)

37323. Gretener, E.—Arc lamp with air current concentration. 29th December, 1955. (804473.)

1956

1173. Couse, K. W.—Voltage change-over plates and electrical systems employing same. 12th January, 1956. (804552.)

3480. Siemens & Halske A.G.—Alloy transistors. 3rd February, 1956. (804696.)

7534. General Electric Co., Ltd.—Electric lighting arrangements incorporating fluorescent lamps. 27th February, 1957. (804503.)

7934. Light & Power Accessories Co., Ltd., and Lott, F. J.—Two-part electrical couplings. 25th April, 1957. (804474.)

8025. Marconi's Wireless Telegraph Co., Ltd.—Colour television and accompanying sound transmission systems. 20th December, 1956. (804475.)

8207. General Electric Co., Ltd.—Glass compositions and glass-to-metal seals. 11th March, 1957. (804635.)

9155. British Thomson-Houston Co., Ltd.—Electromagnetic couplings for power transmission systems. 22nd March, 1957. (804445.)

10324. Philips Electrical Industries, Ltd.—Self-starting synchronous motors. 4th April, 1956. (804624.)

11814. British Thomson-Houston Co., Ltd.—Electromagnetic pumps. 28th March, 1957. (804625.)

12256. Sharp Control Gear, Ltd.—Electromagnetically operated switches. 18th April, 1957. (804476.)

14722. Philips Electrical Industries, Ltd.—Devices for measuring pressures. 11th May, 1956. (804724.)

16164. Vigren, S. D., Broberg, W. O. W., Angerby, E. A., and Zander, R. A.—Electric contact spring sets. 24th May, 1956. (804762.)

18717. Automatic Telephone & Electric Co., Ltd.—Crystal oscillators. 22nd May, 1957. (804725.)

19618. Machlett Laboratories, Inc.—X-ray tubes. 25th June, 1956. (804697.)

23548. Mishima, M.—Current collecting apparatus for small d.c. electrical machines. 31st July, 1956. (804674.)

25808. General Electric Co.—X-ray screens. 23rd August, 1956. (804764.)

29724. Jackson Industries, Ltd. (Fischer, K.).—Switch circuit for electric heating appliances, more particularly hotplates or boiling plates. 28th September, 1956. (804453.)

33081. Electric Machinery Mfg. Co.—Pulse width modulator. 30th October, 1956. (804455.)

33477. Sperry Rand Corporation.—Wave-guide assembly including a member of ferromagnetic material. 2nd November, 1956. (804518.)

34030. United-Carr Fastener Corporation.—Electrical connector plugs. 7th November, 1956. (804519.)

34359. I-T-E Circuit Breaker Co.—Electric circuit-breakers having magnetic blowouts. 9th November, 1956. (804660.)

35545. Allmänna Svenska Elektriska A.B.—Low frequency induction furnace. 21st November, 1956. (804676.)

37405. Erzbergbau Salzgitter A.G.—Magnetic separator. 7th December, 1956. (804678.)

39278. Pasta S.p.A., A.—Insulated electric telephone conductors. 27th December, 1956. (804560.)

39452. Creed & Co., Ltd.—Flat-copy scanner. 28th December, 1956. (804679.)

39498. Kanthal A.B.—Electrically heated apparatus. 28th December, 1956. (804484.)

1957

2088. McGraw-Edison Co.—Hermetically sealed electric storage cells. 21st January, 1957. (804680.)

2155. Graham, C. H.—Cooling electrical apparatus. 21st January, 1957. (804618.)

2929. Magnetic Heating Corporation.—Arc-type oscillators. 28th January, 1957. (804729.)

5597. Babcock & Wilcox, Ltd.—Cyclone furnaces. 19th February, 1957. (804570.)

10178. General Electric Co.—Polyester resin and electrical conductors coated therewith. 28th March, 1957. (804683.)

11590. Collins Radio Co.—Precision step voltage generator. 9th April, 1957. (804628.)

13366. Standard Telephones & Cables, Ltd.—Electron tube grid-winding machine. 26th April, 1957. (804487.)

14766. Nobrac Carbon, Ltd.—Dynamo-electric machines. 9th May, 1957. (Addition to 777511.) (804688.)

20218. Stempel-Hermetik G.m.b.H.—Electric motor driven compressors for hermetically sealed small refrigerating units. 26th June, 1957. (Addition to 792139.) (804748.)

1958

1165. Eitel-McCullough, Inc.—Electron tube apparatus. 2nd August, 1955. (Divided out of 804572.) (804573.)

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 29th November:—

HOOVER (design). No. B778,440. Class 7. Drying machines.—Hoover, Ltd., Perivale, Greenford, Middx.

C.M.A. No. 772,120 and No. 772,121 (design). Class 9. Electric cables and insulated electric wires.—Cable Makers' Association, High Holborn House, 52-54, High Holborn, London, W.C.1.

SOUTHERN TELEVISION (design). No. 773,138. Class 9. Television apparatus and instruments.—Southern Television, Ltd., 20, Tudor Street, London, E.C.4.

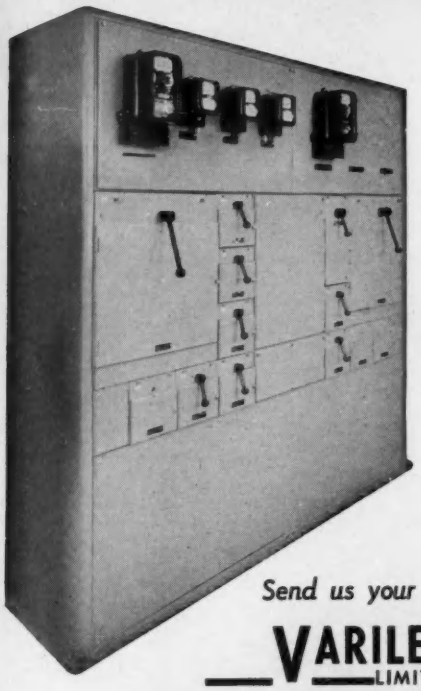
EPIC. No. 776,470. Class 9. Kettles, percolators, flat irons, ozonisers and vacuum cleaners, all being electrically operated goods for domestic use.—Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

RACAL (design). No. 777,834. Class 9. Electrical apparatus and instruments; electronic counting and computing apparatus; radio, radar, television and telegraphic, telephonic, testing and measuring apparatus and instruments; aerials, thermionic amplifiers and frequency meters; and parts.—Racal Engineering, Ltd., Western Road, Bracknell, Berks.

TYPOTRON. No. 778,861. Class 9. Cathode ray tubes.—Hughes Aircraft Co., Culver City, Cal., U.S.A. Address for service, c/o Carpmaels & Ransford, 24, Southampton Buildings, Chancery Lane, London, W.C.2.

Cubicle Switchboards

by VARILECTRIC



UNIT CONSTRUCTION

embodying Combination Fused Switches from our ASTA Type Tested 30 MVA range. 60 amperes to 750 amperes. Standardised dimensions permit ease of assembly. Great flexibility of layout and facilities for extensions.

Our other products include:—

- RISING MAIN SYSTEMS
- CABLE TRUNKING SYSTEMS
- OVERHEAD BUSBAR SYSTEMS
- DISTRIBUTION FUSEBOARDS
- COMBINED DISTRIBUTION FUSEBOARDS AND ISOLATORS

Export Inquiries invited
Specialists in meeting climatic conditions

Send us your enquiries and problems

VARILECTRIC LIMITED

10 MELON ROAD, LONDON, S.E.15

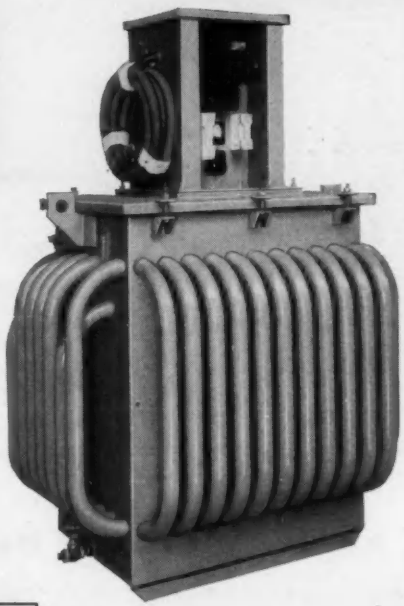
Telephone: Rodney 6895/6/7

Legg

Oil Immersed Charging Equipment

A typical example of Legg oil immersed charging equipment for use with battery operated industrial trucks.

Legg Industries design and manufacture rectifying equipment and transformers for general industrial purposes.



LEGG (INDUSTRIES) LTD · WILLIAMSON ST · WOLVERHAMPTON

We of The Benjamin Electric Ltd., are proud of our long association with the Electrical Industry and we offer our grateful thanks for all the help and encouragement received during the past fifty years. To our customers we are equally indebted for their co-operation during the same period. It is the aim and desire of our world-wide organisation on this our Golden Jubilee, to maintain and strengthen in future years the prestige of the industry of which we are part.

better lighting by BENJAMIN REGD.

THE BENJAMIN ELECTRIC LIMITED · TOTTENHAM · LONDON N.17

TEL: TOTTENHAM 5252 (5 LINES) GRAMS: (BENJALECT · SOUTHTOT · LONDON)

BIRMINGHAM: *5 Corporation Street, Birmingham 2. Tel. Midland 5197* · LEEDS: *49 Basinghall Street, Leeds. Tel. Leeds 25579*

BRISTOL: *Royal London Buildings, Baldwin Street, Bristol. Tel. Bristol 28406*

Smee's 128

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 24th November

BATH.—Smith's Assembly Rooms, 7.30 p.m. Institute of Marine Engineers, West of England Section. "Nuclear Steam Propulsion for Merchant Ships," by W. R. Wootton.

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Radio and Measurement Group. "The Development of a Guided Missile," by W. R. Thomas.

BRISTOL. — Electricity House, Colston Avenue, 6 p.m. I.E.E. Western Utilisation Group. "Electrical Installations in Highly Automatic Industrial Plants," by Lt.-Col. F. A. Richmond.

CARDIFF. — Welsh College of Advanced Technology, Cathays Park, 7 p.m. Institute of Marine Engineers, South Wales Section. "Gas Turbines," by D. L. Brown.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "The Recognition of Moving Vehicles by Electronic Means," by T. S. Pick and A. Readman.

DERBY.—E.M.E.B. Service Centre, 6.30 p.m. I.E.E. East Midland Centre. "The Importance of Research in Hearing and Seeing to the Future of Telecommunication Engineering," by Dr. E. C. Cherry.

IPSWICH.—Crown and Anchor Hotel, 6.30 p.m. I.E.E. East Anglian Sub-Centre. "British Columbia - Vancouver Island 138 kV Submarine Power Cable," by Dr. T. Ingledow, R. M. Fairfield, E. L. Davey, K. S. Brazier and J. N. Gibson.

LEEDS.—At the British Lighting Council, 24, Aire Street, 1, 6.15 p.m. I.E.S. Leeds Centre. "Australian Journey," by W. E. Harper.

LEICESTER. — East Midlands Electricity Board, Charles Street, 7 p.m. I.E.S. Leicester Centre. "Work of the Building Research Station," by P. Petherbridge.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio and Telecommunication Section. "The Use of Dispersive Dielectrics in a Beam-Scanning Prism," by Dr. J. S. Seeley and Dr. J. Brown, "The Quarter-Wave Matching of Dispersive Materials," by Dr. J. Seeley, and "Theory of Reflections from the Rodded-Type Artificial Dielectric," by A. Carne and Dr. J. Brown.

MANCHESTER. — Manchester College of Science and Technology, Sackville Street, 7.15 p.m. Institution of Production Engineers, North Western Region. "Diploma in Technology," by Dr. Whitworth.

NEWCASTLE-UPON-TYNE. — Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North Eastern Centre. "Standardisation of Control Facilities for the British Grid: Communications, Indications and Telemetering," by P. F. Gunning, and "The Development of Communication, Indication and Telemetering Equipment for the British Grid," by G. A. Burns, F. Fletcher, C. H. Chambers and P. F. Gunning.

READING. — George Hotel, King Street, 7.15 p.m. I.E.E. District meeting. "American Electricity Supply Practice," by R. H. Abell.

Tuesday, 25th November

BRADFORD.—Bradford Institute of Technology, 6.30 p.m. I.E.E. North Midland Education Discussion Circle and the Institution of Mechanical Engineers, Yorkshire Branch. Discussion on "The Teaching of Nuclear Engineering for Power Generation," opened by A. D. Collop.

CARDIFF.—At the South Wales Engineers' Institute, Park Place, 7.30 p.m. Incorporated Plant Engineers, South Wales Branch. "Corrosion," by D. W. Marshall.

CHELMSFORD.—Public Library, 7 p.m. I.E.E. Chelmsford Graduate and Student Section. District meeting. "A Review of Industrial Ultrasonics," by R. D. Foskett and D. H. Hardy.

COVENTRY. — G.E.C. Telephone Works, Stoke, 7 p.m. I.E.E. South Midland Centre and Graduate and Student Section. "Electrical Engineers and Electronics," by R. W. Palmer, and "The Post Office Telephone Network," by A. Ness.

Coventry Electricity Sports and Social Club, Merrick Lodge, St. Nicholas Street. Coventry Electric Club. "New Light Sources," by F. Jackson.

LONDON.—Manson House, Portland Place, W.1, 6 p.m. Society of Instrument Technology, London meeting. "Digital Data-Recording for Nuclear Experiments," by R. C. M. Barnes.

Connaught Rooms, W.C.2, 12.30 for 1 p.m. Radio Industries Club. Luncheon. Guest speaker, Sir Gordon Radley.

MANCHESTER. — Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "The Design of the 330 kV Transmission System for Rhodesia," by F. C. Winfield, T. W. Wilcox and G. Lyon.

SWANSEA.—Brangwyn Hall, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. Faraday Lecture on "Automation," by Dr. H. A. Thomas.

Wednesday, 26th November

BIRMINGHAM. — College of Technology, Gosta Green, 6.15 p.m. I.E.E. South Midland Centre. Discussion on "Modern Industrial Applications of Field Plotting," opened by E. R. Hartill.

BRISTOL.—The University, 7 p.m. I.E.E. Bristol Graduate and Student Section. Students' lecture. "Something for Nothing? —Heat Pump Achievements," by G. O. McLean.

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South West Scotland Sub-Centre. "Supply-Voltage and Current Variations produced by a 60-ton, 3-phase Electric Arc Furnace," by Dr. B. C. Robinson and A. I. Winder.

HOVE.—New Imperial Hotel, First Avenue, 7.30 p.m. A.S.E.E. Brighton, Hove and District Branch. "Photography in Research and Industry," by W. S. Sebborn.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "Investigations of Power-Follow Current Phenomena using a Synthetic Power Source," by Dr. L. L. Alston and Professor F. M. Bruce, and "The Impulse Initiation of Arc Discharges," by Dr. L. L. Alston.

I.E.E. London Graduate and Student Section. Visit to Fraser & Chalmers Engineering Works, Erith (2 p.m.).

Memorial Building, 76, Mark Lane, E.C.3, 5.30 p.m. Institute of Marine Engineers. Sir Charles Parsons Memorial Lecture. "Recent Advances in Nuclear Engineering," by Sir John D. Cockcroft.

PORT TALBOT.—At the Steel Company of Wales, 5.30 p.m. Society of Instrument Technology, South Wales Section. "Measurement and Instrumentation Applied to Atmospheric Pollution," by R. A. Granville.

RUGBY.—Rugby College of Technology and Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre and Rugby Graduate and Student Section. "Thermo-Nuclear Reactions," by Dr. S. Kaufman.

Wednesday, 26th November, to Saturday, 29th November

LONDON.—Royal Horticultural Society's Old Hall. Radio Hobbies Exhibition.

Thursday, 27th November

BRISTOL.—Colston Hall, 6.45 p.m. I.E.E. Western Centre. Faraday Lecture on "Automation," by Dr. H. A. Thomas.

CROYDON.—Greyhound Hotel, High Street, 8 p.m. A.S.E.E. South London Branch. "Developments in Floor-heating," by K. G. Stephenson.

INVERNESS.—I.E.E. North Scotland Sub-Centre. District meeting. "Electrical Floor Warming," by J. W. Moule and W. M. Stevenson.

LIVERPOOL.—Exchange Hotel, 7.15 p.m. Incorporated Plant Engineers, Merseyside and North Wales Branch. "Some Aspects of Automatic Control," by R. E. Harvison.

LONDON.—Savoy Place, W.C.2, 2.30 and 5.30 p.m. I.E.E. Utilisation Section. Symposium of papers on "The Provision of Adequate Electrical Installations in Buildings."

Connaught Rooms, W.C.2, 12.30 for 12.55 p.m. Batti-Wallahs' Society. Luncheon. Guest speaker, Sir Stephen Gibson.

SHEFFIELD.—Grand Hotel, 7.30 p.m. Incorporated Plant Engineers, Sheffield and District Branch. "Fire Prevention."

Friday, 28th November

BIRMINGHAM.—Regent House, St. Philip's Place, Colmore Row, 6 p.m. I.E.S. Birmingham Centre. "Headlamps and Signals for Motor Cars," by J. H. Nelson.

Imperial Hotel, Temple Street, 7.30 p.m. Incorporated Plant Engineers, Birmingham Branch. "Statutory Regulations of Steam and Pressure Vessels." Film and talk.

HANLEY.—Grand Hotel, 7.30 p.m. A.S.E.E. Stoke and Crewe Branch. "Power Factor Correction," by F. T. Bartho.

LIVERPOOL.—College of Building, Clarence Street, 6.30 p.m. Institution of Heating and Ventilating Engineers, Liverpool and District Branch. "Hospital Engineering Services," by E. S. Hancock.

LONDON.—Connaught Rooms, W.C.2, 5.30 for 6 p.m. Electrical Power Engineers' Association. Annual dinner.

A.S.E.E. South East London Branch, 6.30 p.m. Visit to Courage and Barclay's Brewery.

14, Rochester Row, S.W.1, 7 p.m. Junior Institution of Engineers. Annual general meeting.

MANCHESTER. — College of Science and Technology, 6.45 p.m. Manchester Association of Engineers. "Electro-Mechanical Themes in Machine Tool Design," by the Earl of Halsbury.

College of Science and Technology, 7 p.m. Institution of Electronics, Northern Division. "Electronic Telephone Exchanges," by Dr. J. E. Flood.

STONE.—Crown Hotel, 8.30 p.m. I.E.E. North Staffordshire Sub-Centre and Graduate and Student Section. Annual dance.

WEYMOUTH.—South Dorset Technical College, 6.30 p.m. I.E.E. Southern Centre. "The Design of Transistors," by Dr. J. R. Tillman.

WOLVERHAMPTON.—Rock Hotel, Tettenhall. A.S.E.E. Wolverhampton and District Branch. Annual dinner.

Friday, 28th November, to Thursday, 4th December

LONDON.—Olympia. Electronic Computer Exhibition and Symposium.

Saturday, 29th November

GLASGOW. — Ca'doro Restaurant, Union Street. Incorporated Plant Engineers, Glasgow Branch. Annual dinner-dance.

Radio and Electronic Component Show

The annual Radio and Electronic Component Show, organised by the Radio and Electronic Component Manufacturers' Federation, is to be held at Grosvenor House and Park Lane House, London, W.1, from 6th to 9th April next. Admission will be by invitation only and applications for tickets should be made to the secretary, R.E.C.M.F., 21, Tothill Street, London, S.W.1.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—Postmaster-General's Department, Melbourne. 15th January. Switchboard keys. (E.S.B. 27171/58. Ten/35709.)* Relay parts. (E.S.B. 27173/58. Ten/35729.)*

Edinburgh.—North of Scotland Hydro-Electric Board. Electrical services and cabling for Lednock power station. (See this issue.)

Honiton.—East Devon Water Board. 15th December. Electrically powered pumping equipment for the Beer water supply scheme. Engineer to the Board, The Laurels, New Street.

Iran.—Ministry of Posts and Telegraphs, Teheran. 13th December. Automatic voltage regulators, potentiometers and accessories. (E.S.B. 27868/58. Ten/35776.)*

New Zealand.—Wellington Corporation. 27th November. Pilot cable. (E.S.B. 28099/58. Ten/35780.)*

Post and Telegraph Department, Wellington. 12th December. Valves. (E.S.B. 28156/58. Ten/35800.)*

South Africa.—Johannesburg City Council. 4th December. Equipment for extension to telephone exchange switchboard. (E.S.B. 27234/58. Ten/35711.)*

Union Tender and Supplies Board, Pretoria. 4th December. Rectifiers. (E.S.B. 27772/58. Ten/35732.)* Aerial cable. (E.S.B. 27773/58. Ten/35733.)* Radio valves. (E.S.B. 28354/58. Ten/35824.)*

Stores Department, South African Railways, Johannesburg. 26th November. Test sets (telephone equipment). (E.S.B. 28088/58. Ten/35804.)* 5th December. Transformers and switchgear. (E.S.B. 27505/58. Ten/35738.)* Copper, galvanised steel and aluminium wire. (E.S.B. 27506/58. Ten/35754.)* Condensers, fuses and wave filter discharge resistances. (E.S.B. 27503/58. Ten/35755.)* 12th December. Metal stripping furnace. (E.S.B. 28086/58. Ten/35782.)*

Sudan.—Stores Department, Sudan Railways, Atbara. 10th December. 180 fluorescent fittings. (E.S.B. 27759/58. Ten/35734.)*

Whitby.—R.D.C. 15th December. Electrically operated automatically controlled ejector units (in duplicate), at Egton Bridge. J. M. McClurg, clerk, Council Chambers, Eskholme, Whitby.

ORDERS PLACED

Durham.—County Education Committee. Electrical installation at the new Birtley South Modern School (£7,200).—A. F. Jemison.

Glasgow.—British Railways, Scottish Region. Electric power and lighting scheme for diesel maintenance facilities, Dundee West motive power depot.—James Scott & Co. (Electrical Engineers). Automatic branch telephone exchange, Perth district offices.—Automatic Telephone & Electric Co. Radar for six vessels, Clyde fleet.—Decca Radar.

Newcastle-on-Tyne. — Regional Hospital Board. Electrical work at radiotherapy department at the Newcastle General Hospital (£1,224).—James Scott & Co. Electrical work at preliminary training school, Northgate Hospital (£1,657).—J. Robinson & Co. (Electrical). Switchgear, cables, fuseboard, etc., at St. Luke's Hospital (£1,253).—Edmundson & Co.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Bagshot.—First instalment of county secondary school (£75,510); J. Harrison, county architect, County Hall, Kingston-upon-Thames.

Berwick.—Houses (36), Spittal Hall estate; J. A. Armitage, borough engineer.

Birkenhead.—Erection of new block of municipal offices, Cleveland Street/Hamilton Square site (£90,000); borough architect, 3, Conway Street.

Departmental store, Grange Road and Horatio Street; Hellberg & Harris, architects, 13, Queen Victoria Road, Coventry.

Birmingham.—Extensions and adaptations at the Dingle Nursing Home to provide hall of residence for 100 College of Technology students (£122,152); E. L. Russell, chief education officer, Council House, 1.

Blaydon (Co. Durham).—Frozen food store and offices for W. D. Mark & Son, York; Glover Partners, Frances Street, London, S.W.1.

Brighton.—Erection of new College of Arts and Crafts; borough surveyor, King's Road, Brighton, 1.

Primary school, Westdene; borough surveyor.

Flats (18), corner of Eastern Road and Bristol Place; Cox (Public Works), Ltd., 5, Duke Street.

Bristol.—Showrooms and offices, Victoria Street; Wm. Cowlin & Sons, Ltd., builders, Stratton Street.

Bromley.—Flats (153), Turpington Lane; town clerk, Municipal Offices.

Burton-on-Trent.—Houses (100), Edge Hill estate; H. T. Meades, town clerk, Town Hall.

Carlisle.—Ice cream factory, King Street, for J. Fontana; Dobinson, Turner & Hughes, solicitors, Bank Street, Carlisle.

Cheshire.—Primary schools at Bramhall, Ellesmere Port, Heswall, Macclesfield and Upton-by-Chester, and large extensions to Crewe County Grammar School for Girls; director of education, City Road, Chester.

Chester.—Houses (40), Hoole House estate; Unity Structures, Ltd., Northern Office, 25, Market Place, Durham.

Chester-le-Street.—Houses for the R.D.C. at Fatfield, Eighton Banks, Birtley and Pelton; F. Bowman, architect, Birtley.

Coventry.—Maternity and child welfare clinic, Barker Butts Lane; city architect, Bull Yard.

Crayford.—Houses (32), Manor Road; U.D.C. surveyor, Town Hall, Crayford, Kent.

Crawley.—Secondary modern school at Tilgate; West Sussex county architect, County Hall, Chichester.

Crewe.—Out-patients' department and nurses' home for Memorial Hospital; Manchester Regional Hospital Board, Cheetwood Road, Manchester, 8.

Crosby.—Fire and ambulance station; County architect, County Hall, Preston.

Croydon.—Houses (98), Lower Addiscombe Road/Grant Place scheme; E. Taberner, town clerk, Town Hall.

Dartford.—Maisonnettes (44), Temple Hill estate; A. A. Stuart & Sons, Ltd., builders, 108, Victoria Street, London, S.W.1.

Doncaster. — Primary school, Bentley (£60,000); borough architect, Doncaster.

Newcastle-on-Tyne.—Garage and showrooms, Westmorland Road, for Adams & Gibbon, Ltd.; M. J. Gleeson, Ltd., contractors, Chesterfield Road, Sheffield.

Norwich.—Swimming and slipper baths, Aylsham Road; city architect.

Peterlee.—Factory (8,000 sq ft) for Waage Woodwool Co., Ltd.; Milton Hindle, Ltd., contractors, Preston, Lancashire.

Plymouth.—Factory; Smiths Potato Crisps, Ltd., Great West Road, Brentford.

Prudhoe (Northumberland).—Houses (89); J. M. Angus, architect, 3, Gallowgate, Newcastle-on-Tyne.

Shiremoor.—Factory; T. N. Douthwaite, Ltd., Blue Bell Road.

St. Albans.—Extensions and alterations to St. Albans Boys' Grammar School (£95,242); C. H. Aslin, Herts. county architect, County Hall, Hertford.

South Kesteven.—Bungalows (44); R.D.C. surveyor, North Street, Bourne, Lincs.

South Oxhey.—Housing estate; D. C. Denton-Smith & Partners, architects, 40, Regent Street, Cambridge.

Stamford.—Further 85 houses, King's Road; borough surveyor.

Stevenage.—Outpatients' centre for New Town (£62,500); Peter Dunham, architect, 42/44, Hastings Street, Luton.

Sunderland.—Houses (93); borough architect, Grange House, Stockton Road, Sunderland.

Swansea.—Factory, Fforestfach, for Flair International Fashions, Ltd.; Cyril A. Hughes & Son, architects, 51, Walter Road.

Tavistock.—Welfare home (£60,000); county architect, 97, Heavitree Road, Exeter.

Thirsk.—Grammar and modern school; Leathart, Son & Tingay, architects, 49, Welbeck Street, London, W.1.

Trowbridge.—Showrooms; H. J. Knee, Ltd., Fore Street.

Walthamstow.—Three-storey showrooms and offices, Hoe Street; borough architect.

Wednesfield.—Grammar-technical school; A. M. Griffiths & Sons, Ltd., builders, Thomas Street, Wolverhampton.

Weston-super-Mare.—Houses (67), Bournville estate; Banks, Wood & Partners, quantity surveyors to borough council, 41, Alma Road, Clifton, Bristol.

Whickham (Co. Durham).—Office block for Ellis (Metals), Ltd.; Mauchlen, Weightman & Elphick, architects, Saville Row, Newcastle-on-Tyne.

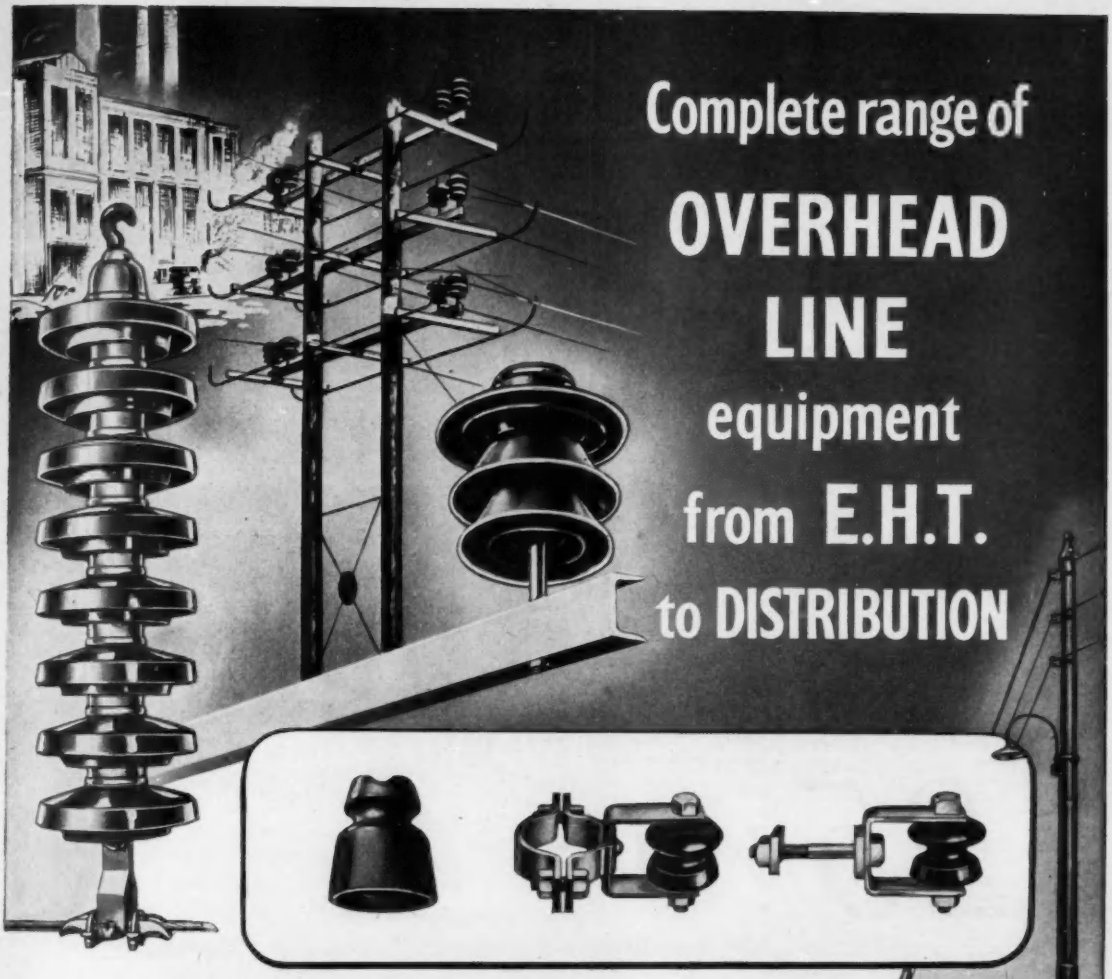
Wigan.—Extensions to Mining and Technical College building (£400,000); clerk to the Wigan and District Mining and Technical College Joint Committee, P.O. Box 78, County Hall, Preston.

Houses (199), Marsh Green estate; borough engineer.

Worcester.—Accommodation for nursing staff and dining room facilities at Powick Hospital (£61,800); secretary to the Birmingham Regional Hospital Board, 10, Augustus Road, Edgbaston, Birmingham, 15.

Wrexham.—Municipal offices; borough engineer.

Yeovil.—Erection of Preston Secondary Modern School; R. O. Harris, county architect, Park Street, Taunton.



Complete range of OVERHEAD LINE equipment from E.H.T. to DISTRIBUTION

When you need Line Equipment you want to be sure that every component part is up to standard and will fit properly into place. This we can guarantee. To ensure absolute accuracy and interchangeability in assembly, we manufacture Complete Units, both porcelain and ironwork, in our own plants. So — whatever your requirements — whether it be Extra High Tension Equipment or the simplest form of Insulator — make sure by specifying "Bullers".

The name and trade mark known the world over for insulators and metal parts of the highest quality.

BULLERS LIMITED

MILTON · STOKE-ON-TRENT · STAFFS

Phone: Stoke-on-Trent 54321 (5 lines)

IRONWORKS: TIPTON, STAFFS. PHONE: TIPTON 1691

LONDON OFFICE: 6 LAURENCE POUNTNEY HILL, E.C.4. PHONE: MANSION HOUSE 9971

JL6

25 years ago . . .

the Company was originated. We are pleased that we still have with us some of our original employees, who through the years have ably demonstrated that the word *SERVICE* in our name is operative.

The Company is always at your service and we hope to merit your continued appreciation of our products.

THE LINDLEY THOMPSON
TRANSFORMER & *SERVICE* CO. LTD.
ST. MARY'S ROAD, LANGLEY, SLOUGH, BUCKS.

THE BRITISH ELECTRICITY GRID UNDER CONTROL

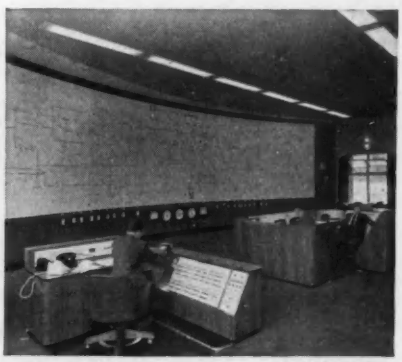
LEEDS GRID CONTROL AREA

Installed by S.T.C. as the centralised control and indication centre for the Leeds Grid Control Area of the British Central Electricity Generating Board. By a new "standardised system" of control the operation of the power stations and switching centres in the counties of Yorkshire and Lincolnshire is efficiently supervised and controlled to supply power to a population of approximately four and a half million people.

▲ LEEDS CONTROL CENTRE

●	GENERATING STATIONS	○	SWITCHING STATIONS ETC.
	YORKSHIRE DIVN.		YORKSHIRE DIVN.
G1	Blackburn Meadows	S1	Attercliffe
G2	Bradford	S2	Dewsbury
G3	Doncaster	S3	Elland
G4	Ferry Bridge	S4	Hunshelf
G5	Grimethorpe	S5	Keighley
G6	Grimsby	S6	Low Road
G7	Halifax	S7	Monk Fryston
G8	Huddersfield	S8	Rodley
G9	Hull	S9	Santon
G10	Keadby	S10	Silsden
G11	Kirkstall	S11	Sowerby Bridge
G12	Mexborough	S12	Staygate
G13	Neepsend	S13	West Hull
G14	Rotherham	S14	West Melton
G15	Skelton Grange		NORTH EASTERN DIVN.
G16	Thornhill	S15	Osbaldwick
G17	Wakefield		
	EAST MIDLAND DIVN.		
G18	Lincoln (G.E.C.)		
	NORTH EASTERN DIVN.		
G19	Foss Islands		

Leeds Control Centre is one of the three control centres installed by S.T.C. for the Thames North, Leeds and Newcastle Control areas in the Central Electricity Generating Board's electricity supply system. This system with its national centre and seven local control centres is the largest system under unified control in the world, having 260 Power Stations and a total output of 24 000 MW. The new "standardised system" of control, general indicating, telephone and telemetering equipment has been developed jointly by the Generating Board and the three telephone manufacturers—Automatic Telephone and Electric Co. Ltd., the General Electric Co. Ltd., and Standard Telephones and Cables Ltd. In addition to the above schemes S.T.C. has played an important part in the remote control schemes for the North of Scotland Hydro Electric Board (NOSHEB), Snowy Mountain (Australia), Owen Falls (Uganda), Waipori (New Zealand), Aswan (Egypt) and Kariba (Rhodesia).



Leeds Control Room

STC

Standard Telephones and Cables Limited

Registered Office : Connaught House, Aldwych, London, W.C.2

TELEPHONE DIVISION: OAKLEIGH ROAD · NEW SOUTHGATE · LONDON N.11

TAKE YOUR PICK

Our wide range of capacitors, incorporating all the very latest developments, are described fully in these new leaflets . . .

SEND NOW for COPIES

DALY has succeeded in maintaining full capacity values and working voltages in more compact designs, specially suited to ultra-modern equipment:

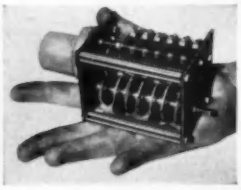
PHOTO-FLASH EQUIPMENT • DEAF AIDS
PRIVATE TELEPHONE INSTALLATIONS
AMPLIFIERS • D.C. POWER UNITS
TRANSISTOR EQUIPMENT
MAGNETISATION EQUIPMENT
TEST GEAR

DALY
ELECTROLYTIC CAPACITORS

Condenser Specialists for over 20 years.

DALY *(Condensers)* **LTD.,** WEST LODGE WORKS,
THE GREEN, EALING, LONDON, W.5. PHONE: EALING 3127-8-9. CABLES: DALCYON, LONDON

MINIATURE CAM TIMER TYPE MSC



Overall dimensions of six cam unit 6⅝" x 3" x 3".

Every cam continuously adjustable.

Switching capacity 10 amps at 230v AC.

Standard unit can have 1-12 switches.

Standard timing cycles between five seconds and twenty-eight days.

ELECTRICAL REMOTE CONTROL CO. LIMITED
HARLOW NEW TOWN · ESSEX
Tel.: Harlow 24032

Ask for KENWELL

ELECTRICAL COMPONENTS

The Kenwell Standard Ball Socket is at the roots of every good lighting installation.

The Kenwell Anti-vibrator which puts life into lamps.

The Kenwell Angle Ball Socket for every North Light roof job.

KENWELL ELECTRIC LTD.
MEANWOOD WORKS, SPOTLAND BRIDGE, ROCHDALE. TEL. 47722

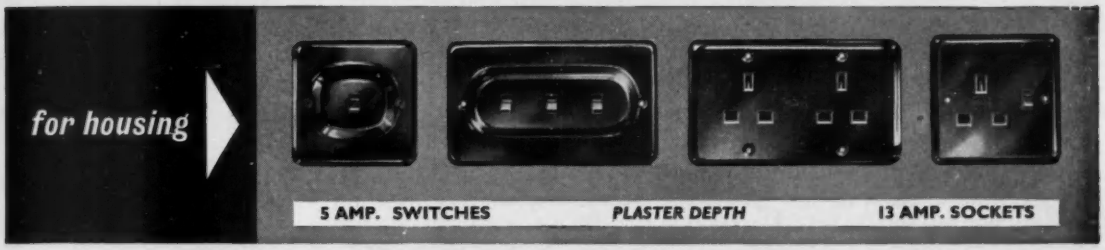
In the interests of more efficient cable jointing

Sheen-Gas

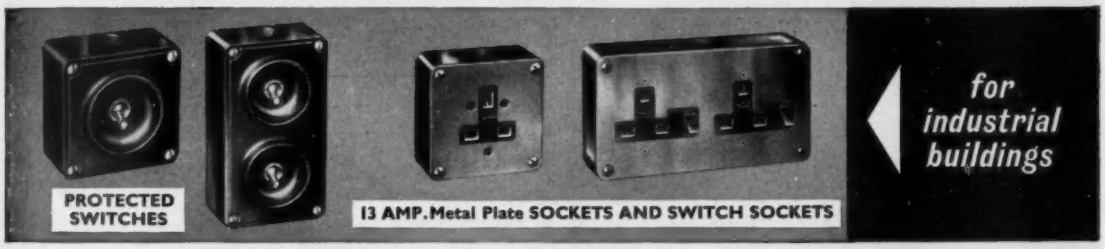
portable furnaces manufactured by HUGH PRICHARD & CO. (Nottm.) LTD
Greasley St. Bulwell
Nottm. Tel: 27-1437

"Design Registration No. 888934"

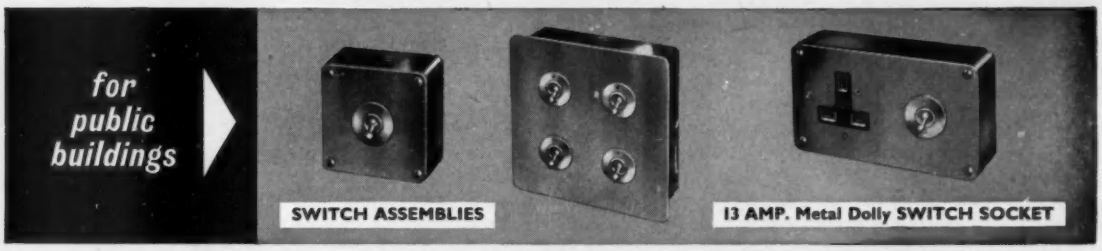
Volex makes the point...



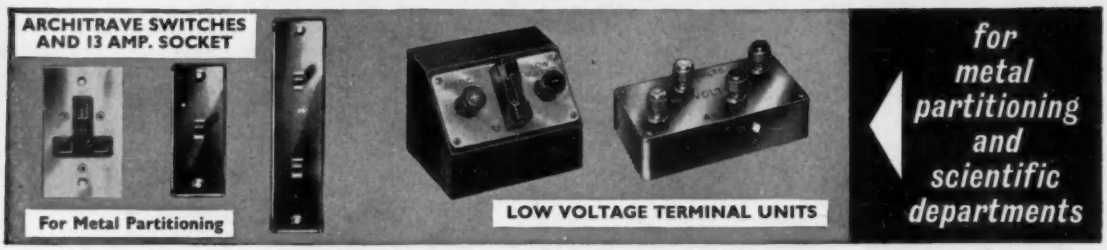
... used by Public Authorities and Government Bodies



... specified by Architects and Consultants



... approved by Contractors everywhere


ARCHITRAVE SWITCHES AND 13 AMP. SOCKET
For Metal Partitioning
LOW VOLTAGE TERMINAL UNITS
for metal partitioning and scientific departments

Send for Illustrated Catalogue giving full details

VOLEX ELECTRICAL PRODUCTS LTD.

Telephone : PENDLETON 4373 SALFORD 6 Telegrams : VOLEXPROD. Salford 6

they're looking up and taking notice!

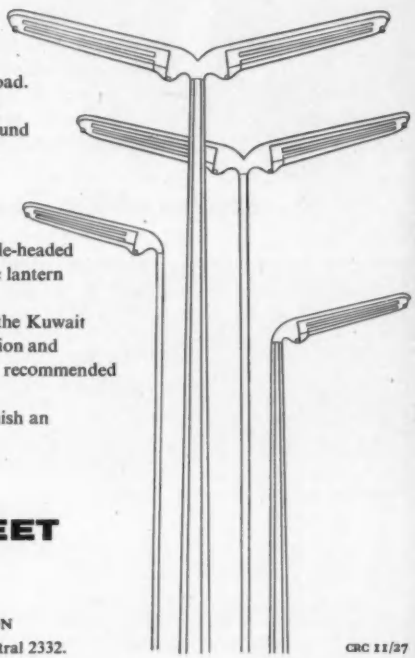
Nowadays people expect increasingly high standards of design in everything that comes into their daily—and nightly—lives. We have developed the Kuwait outdoor lighting system with this fact in mind. It has been approved by the COUNCIL OF INDUSTRIAL DESIGN and adopted by an imposing list of responsible authorities at home and abroad.

The Kuwait Unitary Lighting System provides a comprehensive system of graded sizes and powers for roads of all categories. It is designed around standard interchangeable units and can be adapted and modified at any time, to accord with changes in road or street classification.

Kuwait lanterns are pleasing in appearance, efficient in their use of the available light and easy to service and clean. A single screw releases the perspex bowl for maintenance and relamping. There are single and double-headed versions, and the range of standard head brackets allows the same basic lantern to be fitted to steel, concrete or wood poles and to walls.

Over 40 authorities in the U.K. and many other parts of the world use the Kuwait Unitary system and we thus have considerable experience in its installation and maintenance. For new work or conversions our engineers will provide a recommended layout and subsequently carry out a detailed survey without charge.

We are equipped to install as well as supply the equipment and can furnish an estimate for the whole undertaking if required.



SIEMENS EDISWAN

SIEMENS EDISWAN HIGHWAY AND STREET LIGHTING

SIEMENS EDISON SWAN LIMITED

An A.E.I. Company LAMPS AND LIGHTING DIVISION

38/39, Upper Thames Street, London, E.C.4. Tel: CENtral 2332.

GRC 11/27

DOMESTIC APPLIANCES

ONE ORDER... ONE SERVICE... ONE ACCOUNT...

Morphy-Richards Convectors from £6.7.9

Morphy-Richards Irons from £2.8.1

Morphy-Richards Hair Dryers £3.6.4

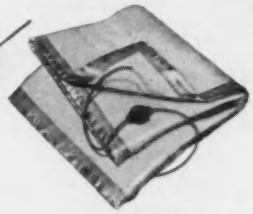
Morphy-Richards Fires from £2.11.1

Morphy-Richards Door Chimes from £1.1.4

Morphy-Richards Spin Dryers £28.10.6

Morphy-Richards Ironers £33.15.2

Morphy-Richards Toasters from £6.8.4



Morphy-Richards Blankets from £3.7.6

Morphy-Richards Super-Suction Cleaner £24.19.0

... supplies at push-button readiness ...

of all domestic electric appliances ...

Extensive National Advertising will build up the public demand for these outstanding Morphy-Richards domestic appliances. Wise dealers will make sure of their supplies by ordering now ... **ring for 5-Depot Service from WINTER TRADING**

WINTER TRADING Co. LTD

6 HARROW ROAD, PADDINGTON, W.2

Telephone: PADdington 3646 (6 lines)

BRANCHES AT:

BIRMINGHAM: 58 Pershore St. Phone: Midland 1920 **CARDIFF:** 31 Bridge St. Phone 21829
SOUTHAMPTON: 20 Bevois Valley Rd. Phone 24273 **ILFORD:** 118 Hampton Rd. Phone 6203

G

Weekes

'SAFETEE' combined switchfuse with interlocked plug

- ★ Standard rating up to 500 amps, 500 volts A.C. or D.C.
- ★ Totally enclosed, watertight or weatherproof to order.
- ★ Quick break.
- ★ Fully interlocked.
- ★ Cartridge fuses.
- ★ Cable entries as required.

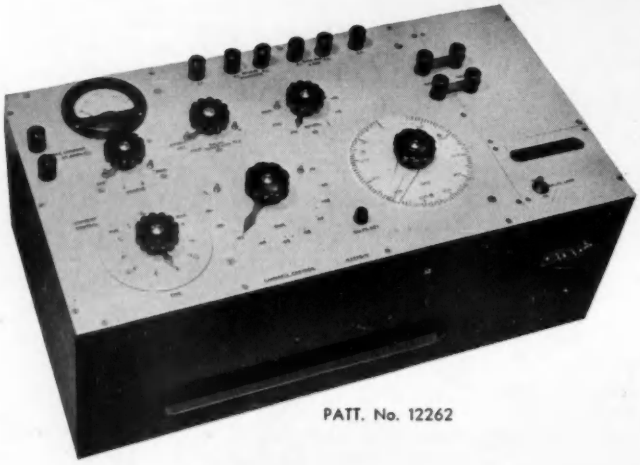
Full details on request from :

Weekes—
The SWITCH-GEAR and FUSE SPECIALISTS

L. WEEKES (LUTON) LIMITED

WINGATE ROAD • LUTON • BEDS
Tel.: LUTON 51478 *Grams: "SAFETEE, LUTON"*

KELVIN D.C. RESISTANCE BRIDGE



PATT. No. 12262

WITH this bridge D.C. resistance may be measured quickly and accurately from 0·000001 to 10 ohms. The accuracy is not seriously affected by contact resistance between bridge and test piece or by fluctuations in supply current.

The resistance value is read on two dials, one of ten 0·01 ohm steps, the other of 0·012 ohms continuously variable—one scale division representing 0·0001 ohm. This range is extended by a seven position multiplying switch.

Pattern No. 12262 A. With multipliers X10, X5, X1, X0·5, X0·1, X·05, X·01. Overall range 0·000001 to 1 ohm.

Pattern No. 12262 B. With multipliers X100, X50, X10, X5, X1, X0·5, X0·1. Overall range 0·00001 to 10 ohms.

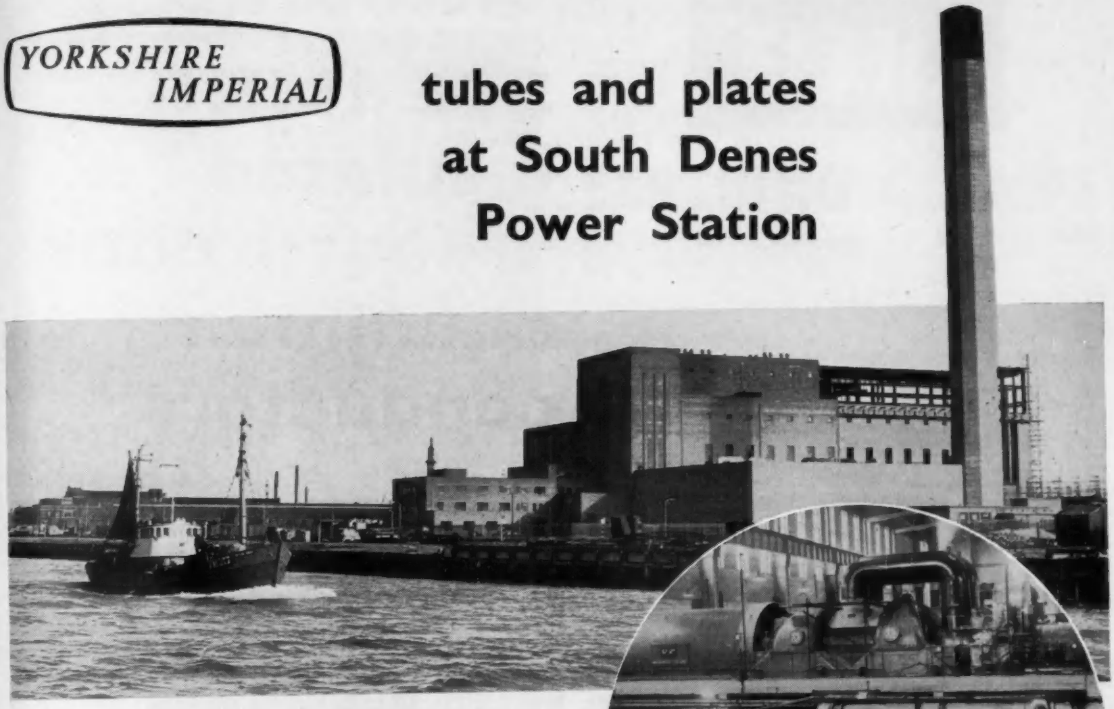
These models include a taut suspension reflecting galvanometer with sensitivity control, and a two-dial current control with ammeter. The maximum current rating is 25 amperes continuous.

GAMBRELL BROS. & CO. LTD.

105/107 Lansdowne Road, Croydon, Surrey
Telephone : CROYDON 8282

YORKSHIRE IMPERIAL

tubes and plates at South Denes Power Station



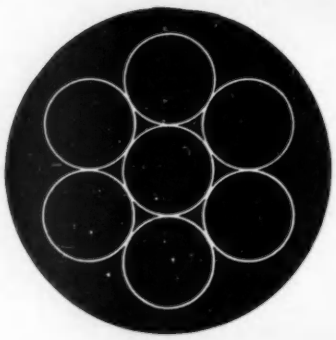
South Denes power station from the River Yare and (right) *60 MW turbo-generator showing condensers*

"Yorcalbro" (aluminium-brass) condenser tubes and *Yorkshire Imperial* Naval Brass condenser plates are installed at the South Denes (Yarmouth) Power Station of the Eastern Division, Central Electricity Generating Board

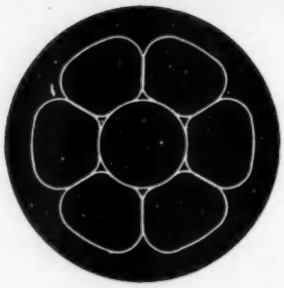
YORKSHIRE IMPERIAL METALS LIMITED

HEAD OFFICE: P.O. BOX 166, LEEDS
TELEPHONE: LEEDS 7-2222

STERLING insulated 'SMOOTH BODY' aluminium conductors



conventionally-stranded conductors



Sterling "Smooth Body" Aluminium Conductors

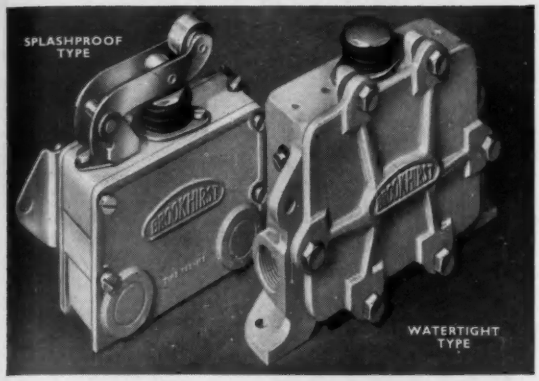
show substantial reductions in

SIZE.....8-9%
WEIGHT..10-12%
AND OF COURSE, PRICE

STERLING

STERLING CABLE COMPANY LIMITED · ALDERMASTON · BERKSHIRE
Telephone: Reading 1000 'Grams: Sterling Phone Reading Telex: 84137 Stericable Ald.

FOR LIMIT SWITCHES



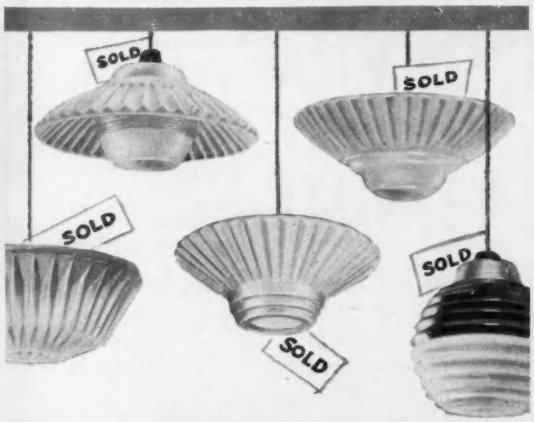
YOU CAN'T BEAT BROOKHIRST

Accuracy, reliability, long life—vitally important characteristics—are all embodied in Brookhirst snap action limit switches. However severe the conditions, you can depend absolutely upon their mechanical and electrical performance—tested to 20,000,000 operations. Full details in Leaflet 2103 —copy on request.

BROOKHIRST SWITCHGEAR LTD.
NORTHGATE WORKS, CHESTER

BROOKHIRST

A METAL INDUSTRIES GROUP COMPANY CVS-67



This could happen to you!

MAISON FITTINGS are popular fast selling lines which appeal strongly to people of discriminating taste, and are being advertised in the class women's home magazines during the autumn and winter months. Made of PERSPEX, the perfect plastic material for light fittings, they are offered in eight attractive translucent colours.

FOR HOMES, HOTELS, SHIPS —WHEREVER ATTRACTIVE LIGHTING IS NEEDED

MAISON FITTINGS

Available from all leading wholesalers or direct from SPECIALITIES LTD., COOPERS ROW, LIVERPOOL 1

"ELMO"

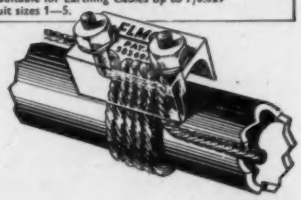
EARTHING CLAMPS

A COMPLETE RANGE TO B.S.951. 1948 IN 4 SIZES

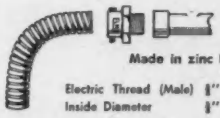
	A123	B45	C67	D8910
for earthing cables up to	7/0.036"	7/0.064"	19/0.064"	19/0.083"
to fit B.S. conduit sizes	1, 2 & 3	4 & 5	6 & 7	8, 9 & 10
i.e. in trade terms	⅜" to ¾"	1" and 1¼"	1½" and 2"	2½" to 3½"

NOTE ALSO: Type A123 is suitable for Earthing Cables up to 7/0.029" and for B.S. conduit sizes 1—5.

"Elmo" Earthing Clamps are of robust construction. Impossible for wire to pull out, always under tension, therefore a most satisfactory earth and a permanent safeguard.



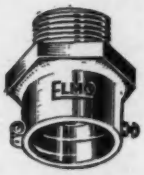
ELECTRICAL FITTINGS



Flexible-to-rigid CONDUIT COUPLINGS

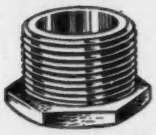
Made in zinc base alloy in the following sizes

Electric Thread (Male)	⅜"	½"	1"	1¼"	1½"	2"
Inside Diameter	⅜"	½"	1"	1¼"	1½"	2"
Electric Thread (Male)		⅜"	½"	1"	1¼"	
Inside Diameter Flexible Conduit	½"	¾"	⅞"	1"		



WITH EARTHING TERMINAL

Special Features: Integral Earthing Terminal, tinned ready for soldering. Fixing screw for continuity. Internal threads suit all makes of flexible tubing.



MALE
Hex. Section

CONDUIT BUSHES

Made in the following sizes:

MALE: Electric Thread
⅜" ½" 1" 1¼" 1½" 2"

FEMALE: Electric Thread
⅜" ½" 1" 1¼" 1½" 2"

FEMALE
Flat Face Section for Spanner (except ⅜" size, which is round)

CONDUIT HOOK

For fluorescent lamps and overhead lighting fittings. Screwed ⅜" thread, male electric.

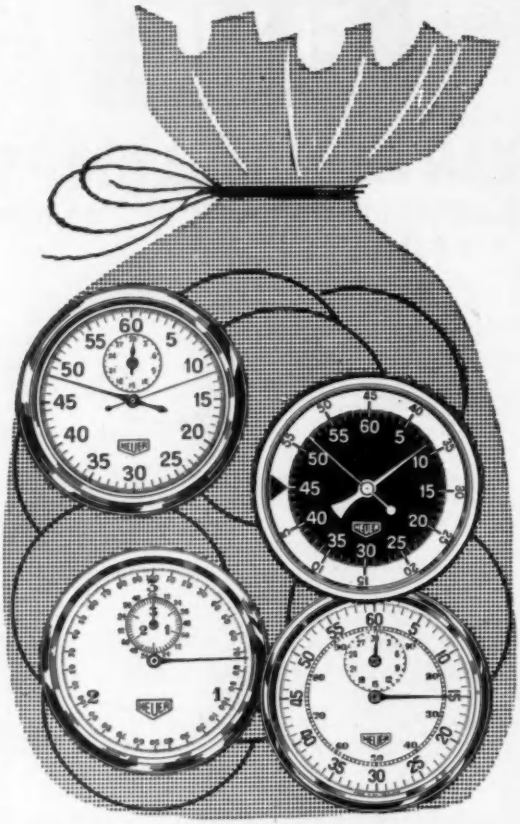
Made to fit all standard boxes with two holes 7/32" diameter —2" centres diametrically opposed. Designed in accordance with British Standard Specification.

Both made in aluminium alloy

CEILING PLATE

One hook

Manufactured by M. MOLE & SON LTD.
BIRMINGHAM · 3 · ENGLAND Est. 1835



Where time is money

Watches of Switzerland Ltd.

present

HEUER TIMERS

Is time money to you? Then ask Watches of Switzerland Ltd. about Heuer timers. There is a model to meet every industrial need; for instance the Heuer Ringmaster ⅕ second timer has 7 interchangeable and individually calibrated dials. However complicated your Heuer timer, its parts are standardised for quick repairs and replacements. Write for catalogue to:

Watches of Switzerland Ltd.

Head Office & Technical Dept., 34-36 Beech Street, E.C.1

TYERS JOINTERS

Liquid Gas Furnace Equipment

ESTABLISHED 1885

THE PORTABLE FURNACE & PATENTS Co

CARRINGTON, NOTTINGHAM

Telephone Nottingham 64887. Telegrams 'Furnace, Nottingham'

FOR ANYTHING IN **MICA**
MICANITE
BAKELITE

Moulding, Commutator, Flexible, Heat-resisting Qualities, Commutator Rings, Spools, Tubes, etc.

Mouldings of any shape or form, Tubes, Plates, Washers, Sheets in all thicknesses, etc.

Natural in all Grades and Qualities, Stove Micas, Plates, Washers, Commutator Segments, Condenser Films, etc.

Send to the Manufacturers:

THE BIRMINGHAM MICA CO. LTD.

South Road • Hockley • Birmingham

Phone: Northern 5631/2 *Telegrams: "Insulation, Phone, Birmingham"*

If you need

a small **METAL PRESSING** for your product, why not consult us?

We specialise in light precision presswork in all metals for the Electrical Trades.

QUOTATIONS BY RETURN

BIRMINGHAM SPECIALITIES LTD.

80-81 Bath Street, Birmingham 4. *Phone: Central 2492*

Career opportunities in industrial electronic control

A career with a difference awaits you with Britain's leading manufacturers of *industrial* electronic equipment. Be in the forefront of the drive to supply industry with the automatic control equipment for the needs of today — and tomorrow!

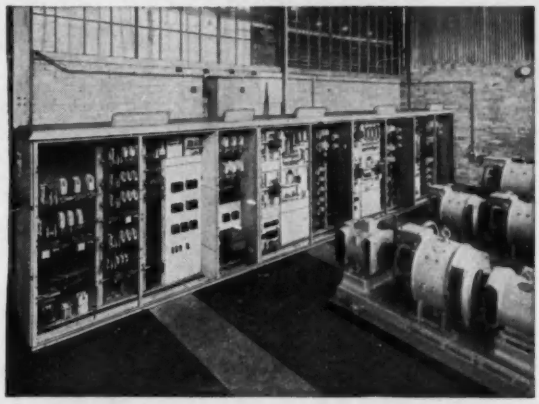
Positions at both senior and junior levels are available for:

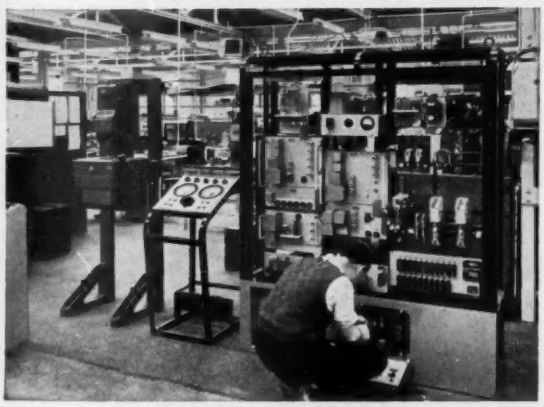
- APPLICATION ENGINEERS
- SALES ENGINEERS
- TECHNICAL WRITERS
- DESIGN ENGINEERS
- DEVELOPMENT ENGINEERS
- SERVICE ENGINEERS
- TEST ENGINEERS
- DRAUGHTSMEN

Apply to Reference FDA at the address below

Equipment currently produced and under continuing development includes; control equipment for electrical machines of all types, specialised drives, regulators, machine tool controls, servo amplifiers and systems, process control equipment, photo-electric equipment, resistance welding controls, computer power supplies, protective and supervisory equipment and a wide range of specialised equipment to meet specific industrial requirements.

Special opportunities for engineers having application experience in the industrial electronic control equipment field, for customer liaison activities. Applications welcomed from engineers having specialised experience in one field, e.g., resistance welding or machine tool control.





LANCASHIRE DYNAMO ELECTRONIC PRODUCTS LTD

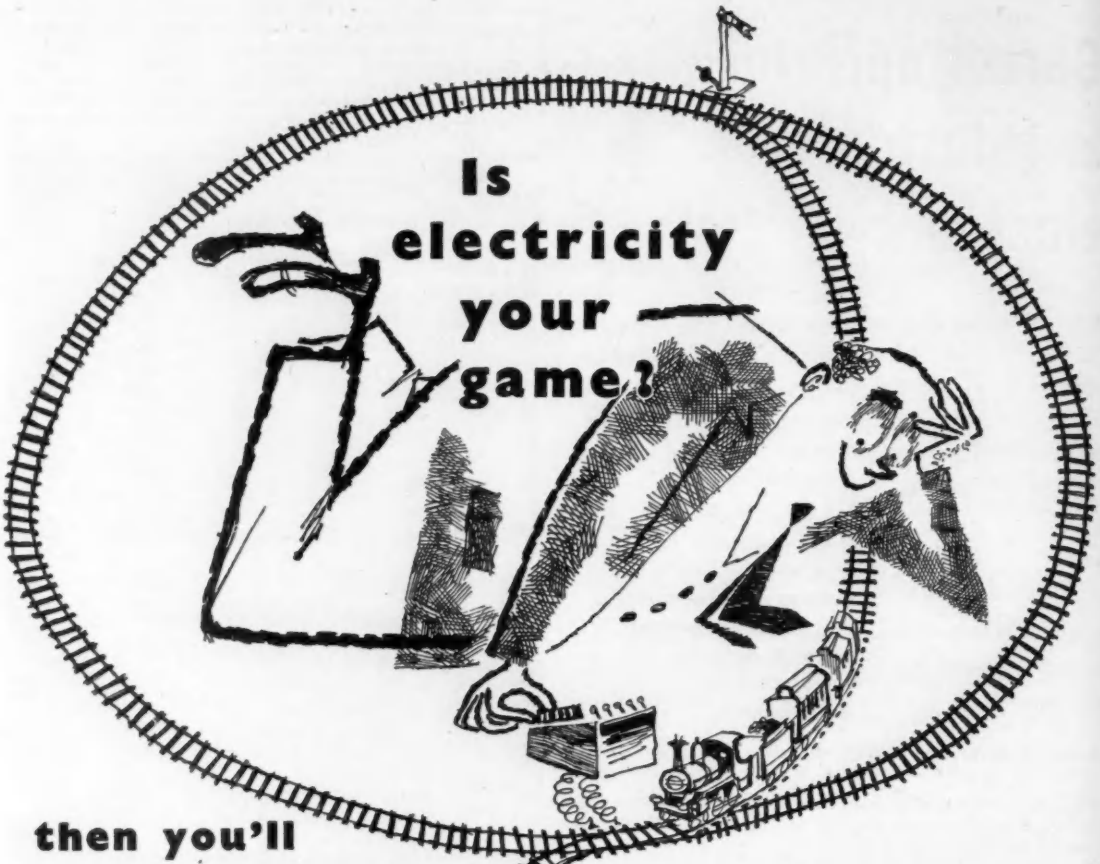
ELECTRONIC BEP EQUIPMENT

RUGELEY, STAFFORDSHIRE, ENGLAND

Manufacturers of Britain's widest range of industrial electronic equipment

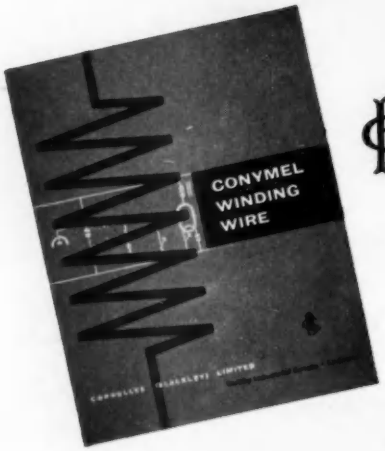
A Member of the Lancashire Dynamo Group

100



then you'll be interested in

CONYMEL WINDING WIRE



Conymel, an all purpose vinyl acetal base winding wire, has been developed for many applications where toughness of insulation combined with flexibility and resistance to the solvents in impregnating varnishes is essential. Our latest Conymel catalogue gives all possible technical information on this type of wire, and will be of the utmost assistance to Designers and Coilwinders. A copy will gladly be sent free of charge on request.

CONNOLLYS (BLACKLEY) LIMITED

Head Office:

KIRKBY INDUSTRIAL ESTATE LIVERPOOL

Telephone: SIMonswood 2664. Telex No. 62-247
Telegrams: SYLLONNOC, LIVERPOOL—Telex

Branch Sales Offices:

SOUTHERN SALES OFFICE AND STORES
23 Starcross Street, London, N.W.1. Telephone EUSton 6122
MIDLAND SALES OFFICE AND STORES
39/44 Watery Lane, Bordesley, Birmingham 9. Tel. VICtoria 4991
Telex No. 33-309

CW.8

Mercury switches

THE MERCURY SWITCH MANUFACTURING COMPANY LIMITED are the largest specialised manufacturers of Mercury Switches in Great Britain. These are made to exceptionally high and uniform standards of quality.
Since its inception in 1932, this Company has concentrated solely on the production of Mercury Switches. It has thereby obtained the widest possible experience and expert knowledge of design, manufacture and application.

THE MERCURY SWITCH MANUFACTURING COMPANY LIMITED
WEST DRAYTON · MIDDLESEX
West Drayton 3157

MS 12

Insist on **T.E.C.**

Power and Distribution Transformers to 100 kVA, Low Voltage Flash Test and Rectifier Units, Metal Work, Light Assembly, Slotted Angles and Transformer & Electrical Repairs

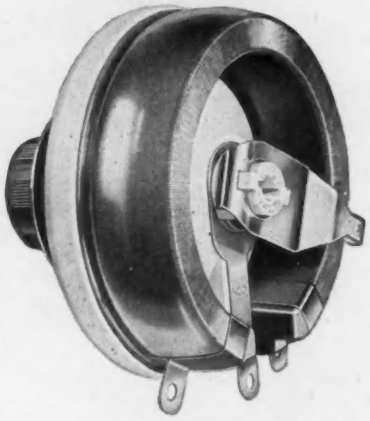
DISTRIBUTION TYPES
UP TO 100 K.V.A. 11 K.V.

Leaflets on request:—

The TRANSFORMER & ELECTRICAL CO. LTD.
HONYWOOD RD., BASILDON, ESSEX
Telephone: Basildon 20491/3

Can you say Toroidally Wound Rheostats twelve times quickly?

It's a bit of a mouthful but you need only say it once — preceded by the name 'Cressall'. Whether you require the vitreous enamelled Cressall 'Torostat' (illustrated below) of extremely robust ceramic unit construction or the well-known open-wound type of rheostat or potentiometer, you will find none better than Cressall.



Forty years' experience in design and manufacture ensure that each Cressall product has extra quality inbuilt.

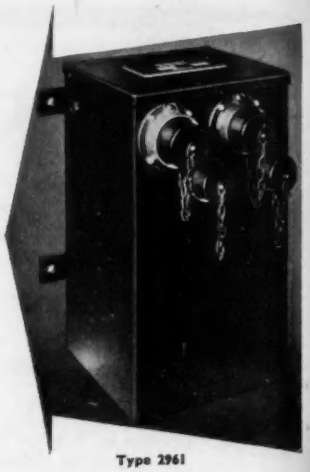
Write for Catalogue Section D, List 63.

Cressall
A.I.D. & A.R.B. APPROVED

THE CRESSALL MANUFACTURING COMPANY LIMITED
(A subsidiary of The Expanded Metal Co. Ltd.)

ECLIPSE WORKS · TOWER STREET · BIRMINGHAM 19 · TEL: ASTON CROSS 2086
LONDON OFFICE: BURWOOD HOUSE · CAXTON ST · S.W.1 · TEL: ABBEY 7766

DANGER . . .



Type 2961

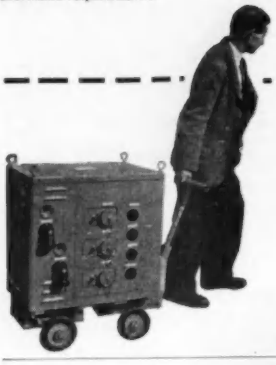
5 kVA Mobile Low Voltage Supply Units

Developed for the Central Electricity Generating Board these units provide a mobile, heavy duty source of power for tools, lighting and similar applications. Units made to suit individual requirements.

Wherever electricity is used—danger lurks. Danger that all too often proves fatal! A broken or loose earth wire, together with a broken cable strand, or an accumulation of carbon dust can produce lethal conditions when the supply is 200/240 volts A.C. Statistics show that in industrial premises 40/50 per cent of all electrical fatalities are caused by portable tools and their allied cables, connecting plugs, etc.

It is for this reason that H.M. Electrical Inspectorate of Factories recommends reduction of voltage to a pressure not exceeding 110 volts together with the earthing of the midpoint of the secondary winding of a step-down Transformer.

New price list is available showing considerable reduction in price of standard units, covering all ratings from 25 VA to 1000 VA. Good delivery available.



...be safe use PARTRIDGE Low Voltage TRANSFORMER UNITS

Partridge Low Voltage Units are approved and used by leading industrial organisations.

PARTRIDGE TRANSFORMERS LTD., CHESSINGTON, SURREY

Telephone: ELMbridge 6737

ZENITH

(REGD. TRADE-MARK)

Insulation FLASH TEST EQUIPMENT

with the unique safety test prods

Equipped with "VARIAC" primary control giving continuous H.T. voltage regulation from zero to maximum. Standard outputs up to 2,000 volts and 3,000 volts.

Illustrated brochure free on request.

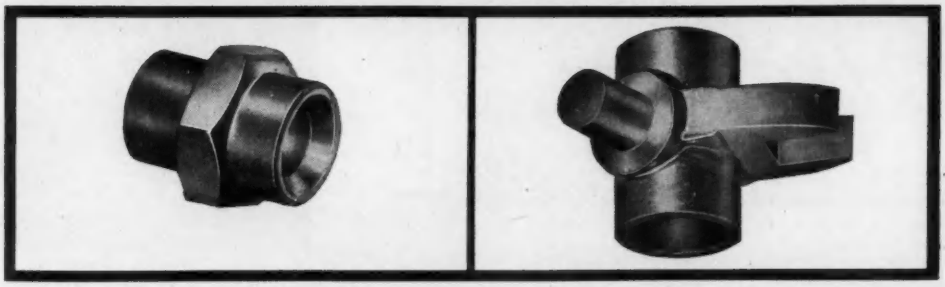
THE ZENITH ELECTRIC COMPANY LTD.

ZENITH WORKS, VILLIERS ROAD, WILLESDEN GREEN, LONDON, N.W.2

Telephone: WILlesden 6581-5 Telegrams: Voltaohm, Norphone, London

MANUFACTURERS OF ELECTRICAL EQUIPMENT INCLUDING RADIO AND TELEVISION COMPONENTS

The choice is often difficult



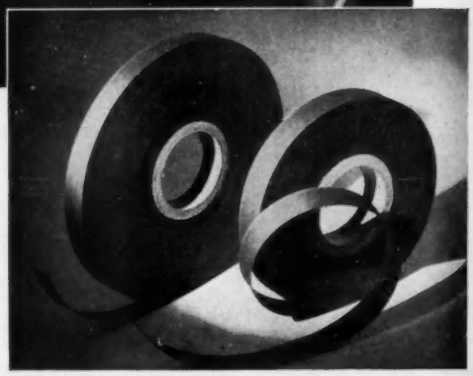
choosing a winner calls for expert judgment...

...and it's the same when choosing between Die Castings and Hot Pressings. For expert advice come to us, for we make *both!* The special experience of our organisation — two separate yet inter-related operations under one roof — is your guarantee of obtaining the correct unit for *your* needs.
Whenever you require a constant or phased supply of dimensionally accurate parts in *Brass, Bronze, Copper* or *Aluminium* — see us first! Our technical representatives are always at your service.

BRASS PRESSINGS (LONDON) LTD • THE NON-FERROUS DIE CASTING CO. LTD.

NON-FERDICA WORKS, NORTH CIRCULAR ROAD, LONDON, N.W.2. *Telephone: GLAdstone 6377*

1731



A Product of Quality—

SPECIFY Castle LEATHEROID

THE SAFE INSULATION FOR ALL ELECTRIC MOTORS

●

Vulcanised Fibre Ltd

BROADFORD MILLS, GUILDFORD, SURREY

MANCHESTER OFFICE
ROYAL BUILDINGS
2 MOSLEY STREET

Telephones :
GUILDFORD
Guildford 5214 (4 lines)
MANCHESTER
Central 5947

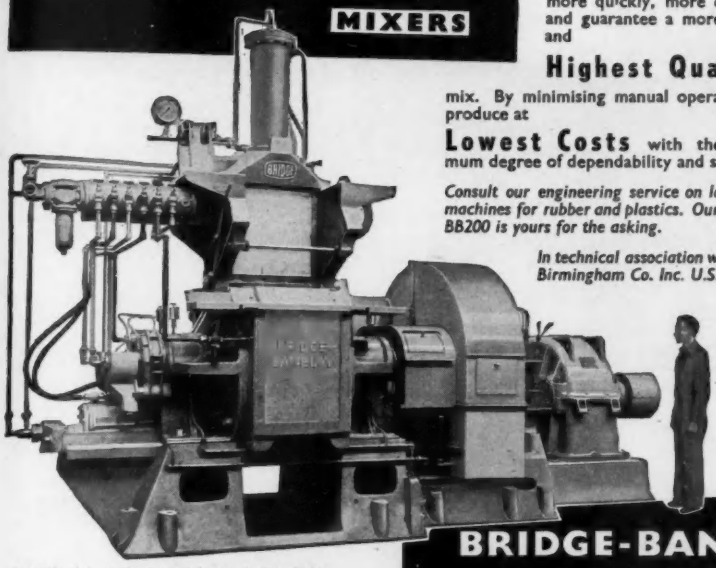
MAKERS OF FINE MATERIALS

Bridge-Banbury MIXERS

Produce the **Highest Output** more quickly, more efficiently, and guarantee a more uniform and **Highest Quality** mix. By minimising manual operating they produce at **Lowest Costs** with the maximum degree of dependability and safety.

Consult our engineering service on layouts and machines for rubber and plastics. Our catalogue BB200 is yours for the asking.

In technical association with Farrel-Birmingham Co. Inc. U.S.A.



SIZE 11 BRIDGE–BANBURY

SIZE 9 BRIDGE-BANBURY

SIZE 3A BRIDGE-BANBURY

SIZE 9 BRIDGE-BANBURY

SIZE 27 BRIDGE-BANBURY

BRIDGE-BANBURY *Automation*

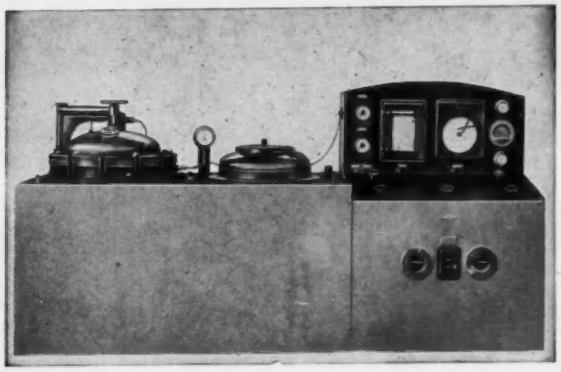
DAVID BRIDGE & CO. LTD., CASTLETON, ROCHDALE, LANCS

Phone: CASTLETON (ROCHDALE) 57216 Grams: Coupling Phone Castleton Lancs
LONDON OFFICE: BROUGHTON HOUSE, 6-7-8 SACKVILLE STREET, PICCADILLY, W.1
Phone: REGENT 7480 Grams and Cables: "EDERACEO" Piccy London

BLICKVAC
HIGH PRESSURE & VACUUM IMPREGNATORS

BLICKVAC Impregnators are used by Marconi, Pye, S. Smith & Sons, N.C.B., M.O.S. and many other well-known organisations. A full range of standard models is available — capacities 4 in. by 9 in. to 3 ft. by 3 ft. — suitable for Varnish, Wax, Potting Resins, etc. Plants can be designed for special requirements. Blickvac Impregnators are designed to give simplicity in control, outstanding performance and ease in cleaning. A second autoclave can be added at low cost when needed.

BLICKVAC products include :- Epoxy Resin Vacuum Mixing and Casting Plants, Electric Ovens, Vacuum Ovens, Mixing Vessels, Dipping Tanks, etc.



BLICKVAC ENGINEERING LTD. Bede Trading Estate, Jarrow, Co. Durham
Telephone: Jarrow 897155

LONDON OFFICE: 96/100 Aldersgate St., E.C.1
Telephone: MONarch 6256

in gear with JEARY

For Industrial electrical equipment

FRACTIONAL H.P. MOTORS
GEARED MOTORS

Fan Stockists

AXIAL FLOW	4¾" to 30"
" " (Flameproof)	12" to 30"
PROPELLER	7½" to 30"
" (Flameproof)	12" to 30"

WINDOW FANS

CENTRIFUGAL BLOWERS

JEARY

ELECTRICAL COMPANY LIMITED

Successors to G. Braulik (Estd. 1887)

Orders and special enquiries should be sent to the main stores

132/142 EAST ROAD, LONDON, N.1. Tel.: CLErkenwell 4141

Directors' Office: 5 Lambs Buildings, London, E.C.1. Tel.: MONarch 8302

WEATHERPROOF METAL-CLAD SOCKETS, PLUGS, SWITCH SOCKETS etc.
for all electrical purposes

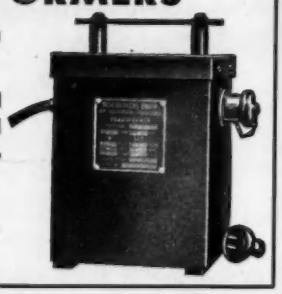
NIPHAN
5-300 amp. 250-500 Volt
Diagram for Temporary Lighting with fittings connecting to 6-way Tee
Push-on Plug
Cast Brass Terminal Socket and Cover
C.I. Switch
Push-on Flange Socket with Spring Cover
6-way Tee and Cover

SIMMONDS & STOKES (NIPHAN) LTD
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1. HOLborn 2163, 8637

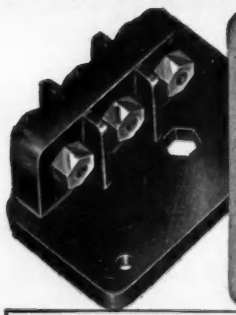
VOLTAGE DROPPING TRANSFORMERS

For Electric Tools on 110 volts

Full range of fixed and portable types in all capacities, or made to specification. *List free*

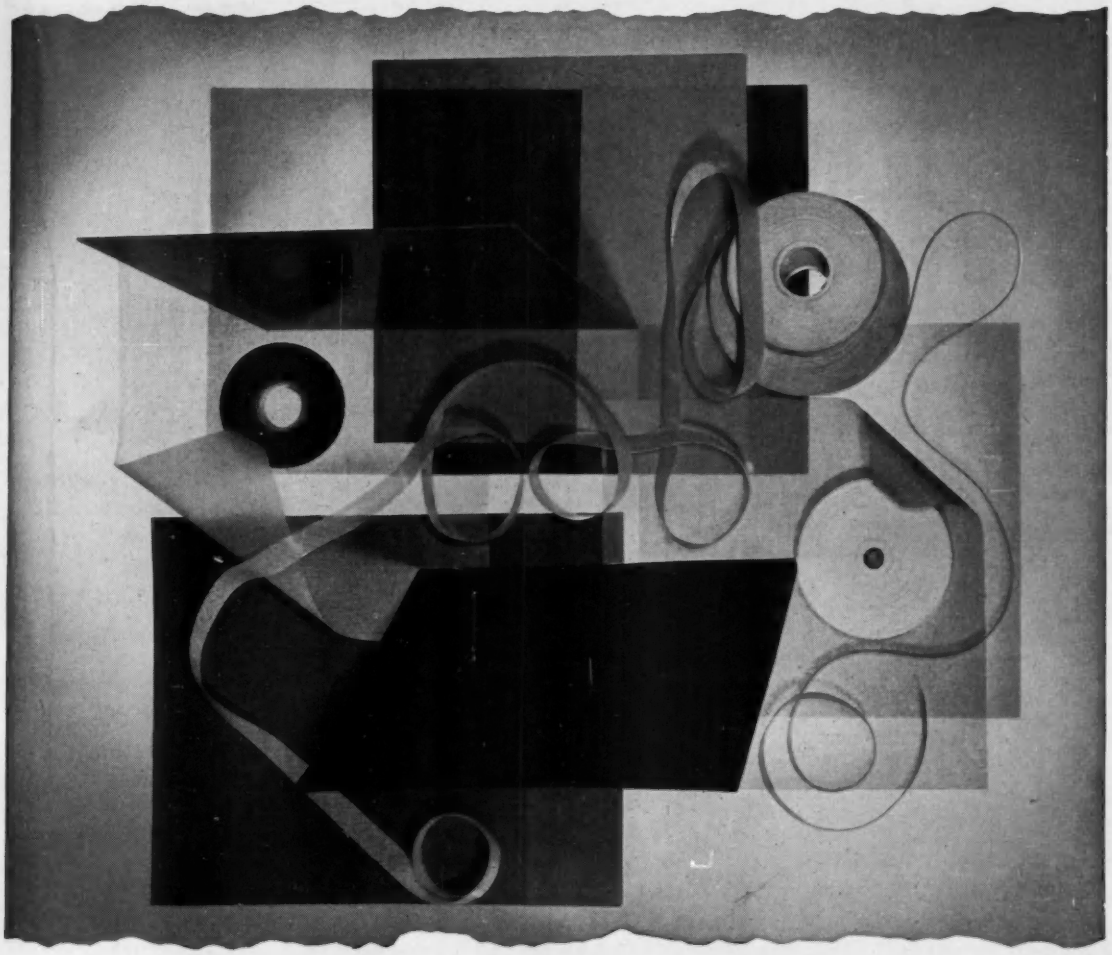


SIMMONDS BROS.
STOURBRIDGE



Quality PLASTIC MOULDINGS with Service

Consult SOUPLEX Limited
WESTGATE · MORECAMBE Phone 1717/8



Sistoflex, Elephantide, Presspahn, Leatheroid, Fibre, Bakelite, Cotton and Varnished Tapes, Insulating Paper, Adhesive Tapes, Varnished Silks and Cambrics

All the best *

INSULATING MATERIALS

meet at

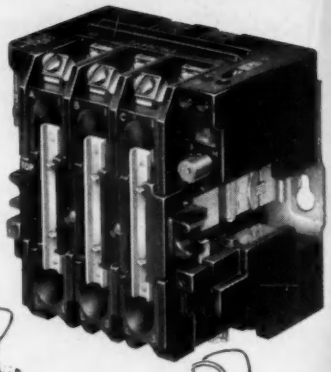
SPICERS

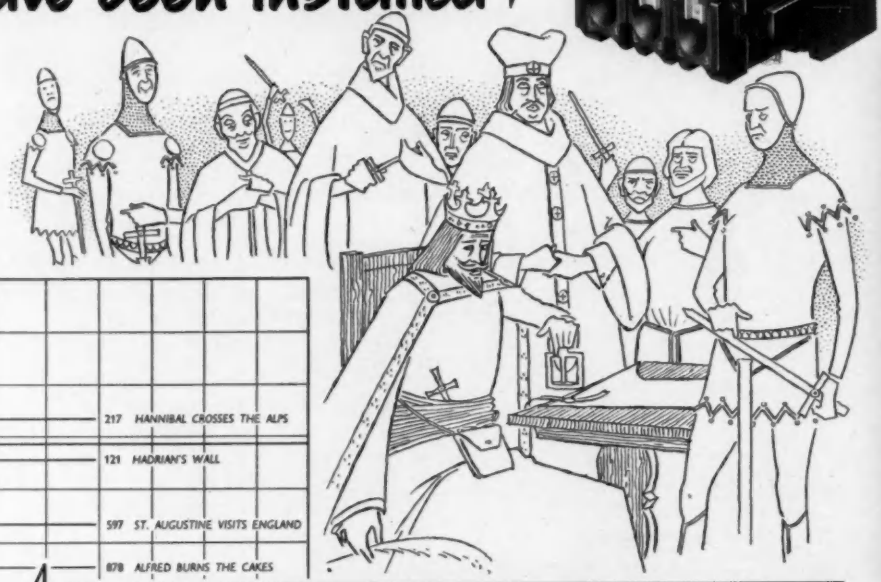
* 'Best'—*not necessarily the most expensive but, always, unquestionably the best of their respective kinds for insulating purposes. Remember, too, that Spicers range of papers, boards and packaging materials is the most extensive in Great Britain and is backed by full, efficient service from any of the Spicers branches in all parts of the country.*

SPICERS LTD • 19 NEW BRIDGE STREET • LONDON EC4 • BRANCHES THROUGHOUT BRITAIN • ASSOCIATED & SUBSIDIARY COMPANIES ALL OVER THE WORLD

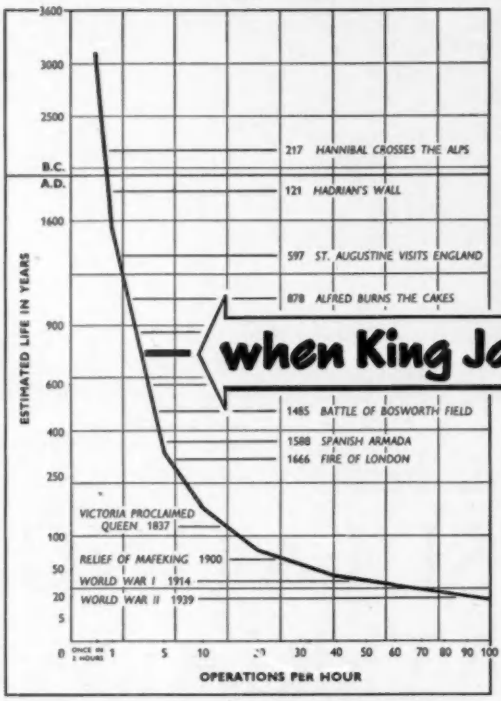
TBW/E1

if this CRABTREE starter could have been installed





when King John signed Magna Carta



GRAPH SHOWING TIME TAKEN IN YEARS RELATED TO 4,100,000 OPERATIONS PERFORMED BY CRABTREE TYPE B-15 CONTACTOR (BASED ON A 50-HOUR WEEK AND A 52-WEEK YEAR)

Tests are now proceeding in which Crabtree Type B-15 starters are being used for repeatedly stopping and starting motors. To date, the starters have given the following operations (start and stop) without change of contacts —

(a) Controlling a 5 h.p. motor : 4,500,000 operations ;

(b) Controlling a 1 h.p. motor : 4,500,000 operations.

These tests are continuing.

The contacts would now need inspection

Type B-15 contacts, on actual motor-load life tests, have already achieved 4,500,000 operations (start and stop) and are still giving satisfactory service.

J. A. CRABTREE & CO. LTD., LINCOLN WORKS, WALSALL, STAFFS.

C782

'Tis distance lends enchantment to the view,
And robes the mountain in its azure hue.

(Pleasures of Hope by Thomas Campbell)

By courtesy of Tourist Information Centre, Belfast

Irish cables are manufactured amidst scenery depicted above, showing the famous and beautiful Mourne Mountains

IRISH CABLES will stand inspection right through to the very core, as a result of the high quality of materials used and constant vigilance and inspection throughout manufacture

IRISH CABLES LIMITED

NEWCASTLE · CO. DOWN · NORTHERN IRELAND

Telephone: Newcastle (Co. Down) 2331/2

Belfast Office:
2a, HARTINGTON STREET
BELFAST · Northern Ireland
Telephone: Belfast 27922/3

London Office:
19/21 FITZROY STREET
LONDON, W.1
Telephone: LANgham 8317/9

3*

RIST'S
TERMINATE YOUR WIRING PROBLEMS—
If your requirements are for terminals, you can have them, and if you need terminated cords, leads or cable assemblies, we can make them.
RIST'S WIRES & CABLES LTD.
LOWER MILEHOUSE LANE · NEWCASTLE · STAFFS

MEKELITE

GEARED JOINT

INDUSTRIAL LIGHTING UNITS

(Scale 1/8 full size)

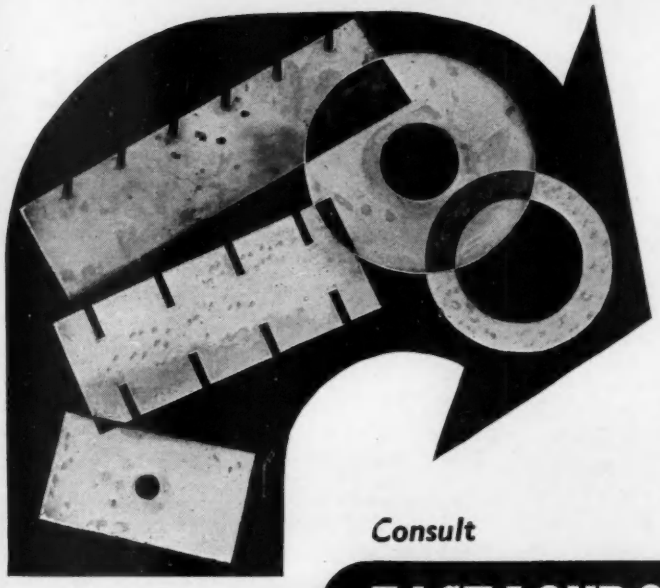
Catalogue sent free on request

Sudsproof Head

Where trouble is experienced on machine tools due to suds getting into the lampholder, the sudsproof head with enclosed lampholder can be used instead of the standard head.

Various lengths of arm (maximum horizontal reach 54 in.). With pillar or short vertical pivot. Six sizes of reflector. Bases for wall, bench, ceiling, floor or for mounting direct on machines. Also portable types.

MEK-ELEK Engineering Ltd., 17 Western Road, Mitcham, Surrey
Phone: MITcham 3072 Cables: Mekelek, London



for

MICA INSULATION

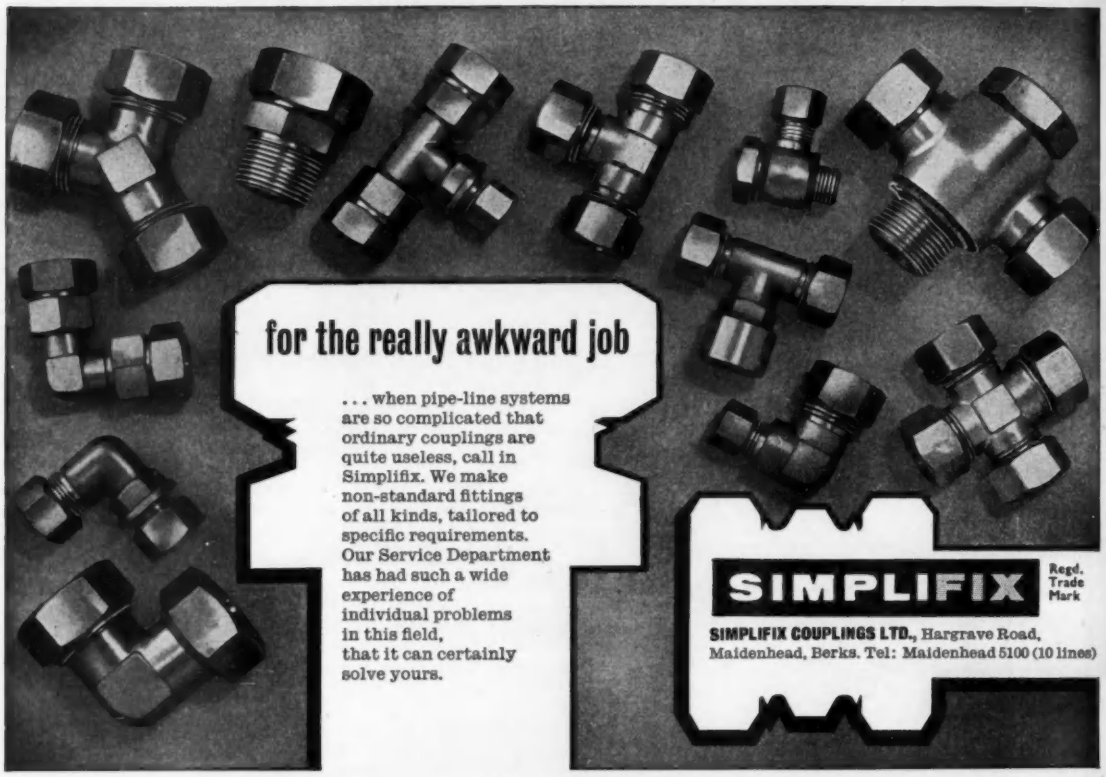
Consult

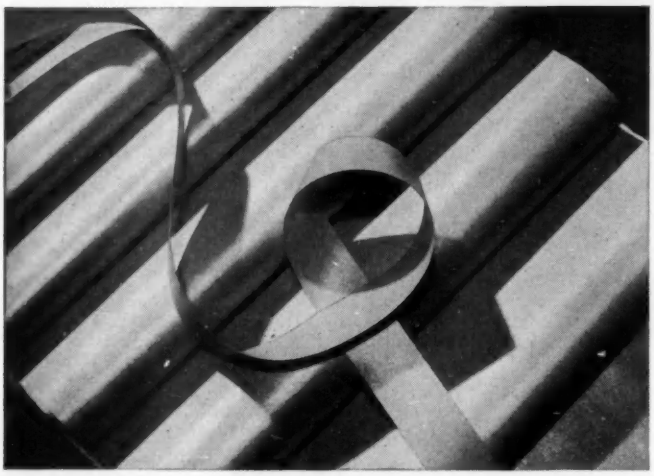
EAST LONDON MICA WORKS

RINGWOOD RD., WALTHAMSTOW, LONDON, E17

ESTD. 1912

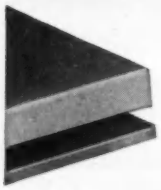
Phone:
COPpermill 2248/9
Telegrams:
Elmicmer, Easphone, London


for the really awkward job
. . . when pipe-line systems are so complicated that ordinary couplings are quite useless, call in Simplifix. We make non-standard fittings of all kinds, tailored to specific requirements. Our Service Department has had such a wide experience of individual problems in this field, that it can certainly solve yours.
SIMPLIFIX
Regd. Trade Mark
SIMPLIFIX COUPLINGS LTD., Hargrave Road, Maidenhead, Berks. Tel: Maidenhead 5100 (10 lines)



DIELECTRIC PLUS

Insulating cloths and tapes manufactured by IOCO LIMITED provide the necessary dielectric strengths appropriate to various classifications. In addition they possess properties of thermal stability, mechanical strength, moisture resistance, flexibility, toughness and minimum bulk which fit them for service under almost any conditions in any part of the world. Full technical literature will be sent on request.



FORMAPEX

Laminated plastic boards and sheets, paper or fabric based, are used widely for terminal boards, switchgear, rigid insulation, etc.

For cable and general service

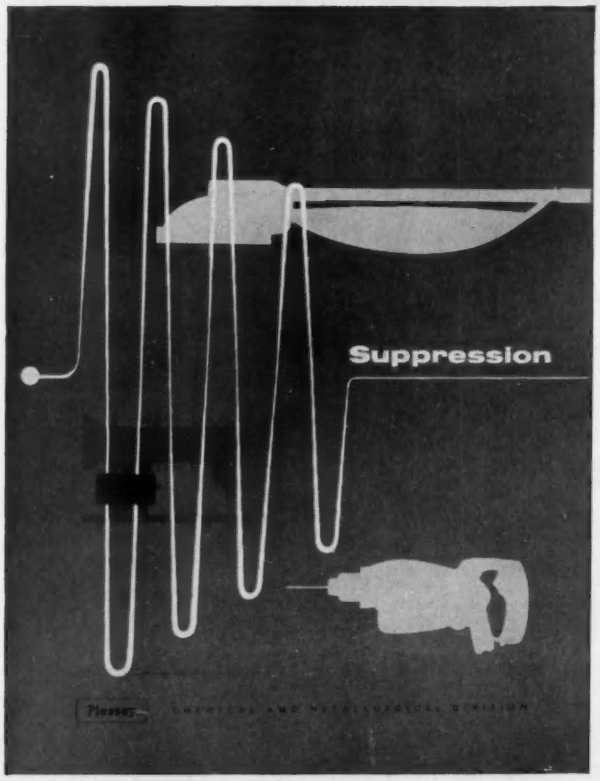
LINAPEX—*cotton, silk, nylon, or glass fabric base coated with specially developed varnishes. Available in various thicknesses, straight or bias cut.*

IOCO LIMITED

Anniesland Glasgow W3 Telephone: Scotstoun 5501-6

on the subject of suppression

This new Plessey publication is designed to assist all those currently concerned with the problems of suppression of all electrical equipment. The book provides Design Engineers with a standard reference to the complete range of suppressors produced by Plessey at Towcester, their individual suitabilities in application, their construction and their operational characteristics. Many illustrations and dimensional diagrams are included. Please ask for Plessey Publication No. 952.



Plessey

COMPONENTS GROUP
CHEMICAL AND METALLURGICAL DIVISION
THE PLESSEY COMPANY LIMITED
WOOD BURCOTE WAY
TOWCESTER, NORTHANTS
TEL: TOWCESTER 312

Overseas Sales Organisation:
PLESSEY INTERNATIONAL LIMITED
ILFORD ESSEX ENGLAND
TEL: ILFORD 3040

TC.1

He "Woodpecker" a hole in an oak

but . . . . .

A.S.C.M. Conduit

gives that essential protection

BS 31
CERTIFIED
A.S.C.M
MADE IN ENGLAND

A.S.C.M. MEMBERS *are as follows . . .*

GENERAL ELECTRIC CO. LTD.
Incorporating:
Oriental Tube Co. Ltd.

METALLIC SEAMLESS TUBE CO. LTD.

MONMORE CONDUITS LTD.

SIMPLEX ELECTRIC CO. LTD.
Incorporating:
Credenda Conduits Co. Ltd.
Simplex Conduits Ltd.
Stella Conduit Co. Ltd.

WALSALL CONDUITS LTD.

Associate Members

ELECTRICAL CONDUITS LTD.
HILDICK and HILDICK

THE STEEL TUBE & CONDUIT CO. (Middlesbrough) LTD.

ASSOCIATION OF STEEL CONDUIT MANUFACTURERS • 96 HAGLEY ROAD • BIRMINGHAM 16

REVO 'POLYESTER' MASTERS THE CONTROL GEAR PROBLEM

80 watt switch start
2½" x 1⅜" x 7"
(base length)

Details from:

Revo Electric Co. Ltd., Tipton, Staffs.
A Duport Company
Member of the British Lighting Council

NOW REVO BALLASTS ARE

Quietest
Smallest
Coolest
Lightest
Toughest

The new Polyester technique

It surrounds coil and core completely with polyester resin. Result:

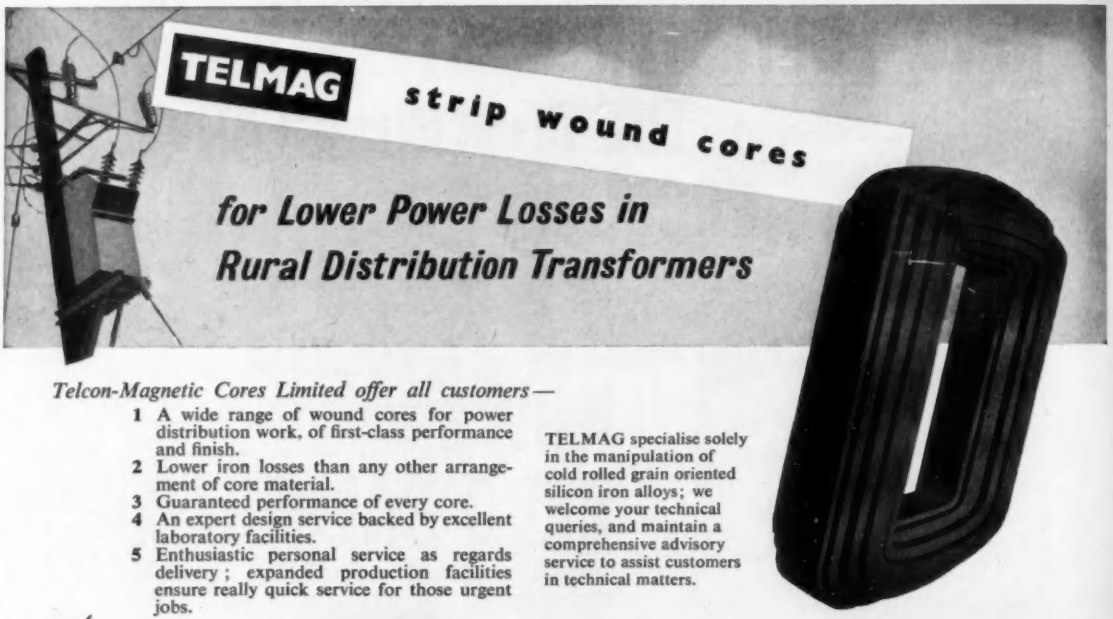
- Coil and core are completely protected, there is no atmospheric deterioration—and no 'ballast hum.'
- Size and weight are reduced. Easier to install and to adapt for many varieties of lighting.
- Polyester removes heat generated internally, and will NOT melt.

Tube performance is improved

Revo polyester ballasts guarantee a *constant* flow of energy to the tube at the correct wattage. This means maximum light output at minimum cost—and a longer tube life.

REVO MAKE A COMPLETE RANGE OF POLYESTER CONTROL GEAR

Made in association with Philips



Telcon-Magnetic Cores Limited offer all customers—

1 A wide range of wound cores for power distribution work, of first-class performance and finish.
2 Lower iron losses than any other arrangement of core material.
3 Guaranteed performance of every core.
4 An expert design service backed by excellent laboratory facilities.
5 Enthusiastic personal service as regards delivery; expanded production facilities ensure really quick service for those urgent jobs.

TELMAG specialise solely in the manipulation of cold rolled grain oriented silicon iron alloys; we welcome your technical queries, and maintain a comprehensive advisory service to assist customers in technical matters.

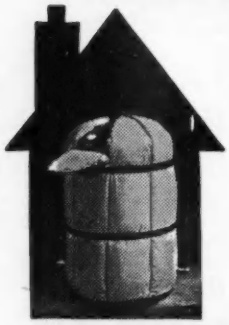
You can rely on **TELMAG** *for quality and service*

TELCON-MAGNETIC CORES LIMITED
CHAPELHALL, AIRDRIE, LANARKSHIRE, GREAT BRITAIN
Telephone: Airdrie 2283-4 Telegrams: TELMAG, Airdrie
A MEMBER OF THE TELCON METALS GROUP

Made to measure

EETO

CYLINDER JACKETS



After more than a generation EETO Cylinder and Tank Jackets are still relied upon by Plumbers and Heating Engineers everywhere.

The ORIGINAL Sectional Jackets, their superb quality places them in a class by themselves.

EETO INSULATIONS LTD.
RIVER STREET, BOLTON, LANCS.
TEL: BOLTON 3764.

CW 2730

DUFF NORTON JACKS

make cable drum handling easier

For quicker, easier, safer handling of cable drums, the world-famous range of Duff-Norton Jacks now features a special 5 ton cable-drum model which accommodates a range of drum sizes. Ratchet-lowering principle ensures absolute safety, prevents damage to drum or cable resulting from sudden impact with ground.

• Three cradles for drum spindle at 8 in., 16 in., and 24 in. above ground. • Lift 10 in. • Up to 2 in.-diameter spindles accommodated. • Wooden base 2 ft. × 9 in. × 2 in. • Weight 66 lbs.

Recognised as the world's standard for over sixty years.

Duff-Norton

Made by
CONSOLIDATED PNEUMATIC TOOL CO. LTD.
232 DAWES ROAD, LONDON, S.W.6

ALDRIDGE

do a better job in plastics

If you want a better job done in plastics, Aldridge will do it. Take this new telephone for instance. Thanks in a great measure to the use of plastic mouldings manufactured by Aldridge, here is how it compares with the present conventional type :

- It is approximately 40% lighter
- costs 24% less for materials
- requires only 25% of the labour
- is produced 210% faster
- employs an 8 oz. injection machine instead of a 300 ton moulding press
- doesn't need to be 'de-flashed'
- holes can be punched instead of drilled
- made of tough, high impact polystyrene

Aldridge do a better job in plastics because they never stop thinking plastics, dreaming plastics and improving their techniques for manufacturing intricate, accurate shapes in plastics. Give them a product in another material—or even one already made in plastics—and it's pretty certain that they'll be able to give you a still better job in plastics. Let them see it in the design stage and they'll show you how it can be simpler, cheaper and better in plastics.

You are invited to get in touch with

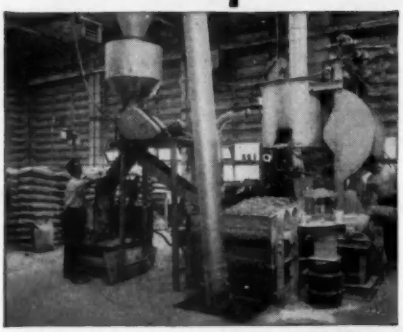
ALDRIDGE PLASTICS LTD

An A.E.I. Company

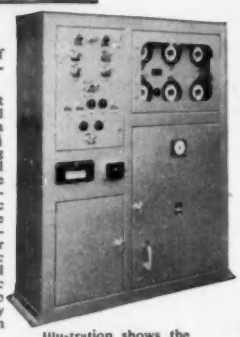
Redhouse Industrial Estate, Aldridge, Staffordshire
Tel: Aldridge 52031 (3 lines)
Sales Office: 155 Charing Cross Road, London, W.C.2
Tel: GERrard 4820 & 8660

CRC A1

120 HOURS A WEEK Non-stop!



BKS



We specialize in the design and manufacture of automatic sequence control panels and have supplied them to practically every industry.

This control Panel has been designed and built for the sequence control of synthetic resin coated sand processing. The machine operates 5 days a week—day and night—non-stop producing 1½ tons of coated sand every hour. After loading the hoists the Panel automatically controls all process operations including discharge into the sacks. The Floor Mounted Controller incorporates H.R.C. fuses and heavy duty automatic starters for all motors which total 100 horse power. Mounted on the Panel are 6 visible continuously adjustable dial process timers with tamper proof operation counter giving full automatic control of the coating operations with manual control for sampling. This method of automatic control definitely reduces production costs. Scrap caused by incorrect mixing by hand is entirely eliminated and uniformity in batch production constantly maintained.

Illustration shows the compact design of the B.K.S. Panel.

May we receive your enquiries—We are confident that our suggestions will save you time and product cost.

SPECIALISTS IN ELECTRICAL CONTROL

Send for our catalogue illustrating special panels and complete range of Standard Motor Control equipment.

BRITISH KLOCKNER SWITCHGEAR LTD.

HEAD OFFICE AND WORKS: **CHERTSEY, SURREY**

Telephone: Chertsey 3467

LONDON:	Refer to Head Office
MANCHESTER:	Cromford House, Cromford Court, Manchester 4 Tel: BLAckfriars 3903
GLASGOW:	249 St. Vincent Street, Glasgow, C.2. Tel: CENtral 2479
NEWCASTLE:	Mr. H. Breeze, 4 Beechwood Avenue, Monkseaton, Whitley Bay, Northumberland. Tel: Whitley Bay 24231
BIRMINGHAM:	Mr. J. Perry, 45 Streetly Crescent, Four Oaks, Sutton Coldfield, Warwickshire. Tel: Streetly 1641
DUBLIN:	Mr. H. E. Kilbride-Jones, 11 Crow Street, Dublin. Tel: Dublin 71717

Post this coupon TODAY

To BRITISH KLOCKNER SWITCHGEAR LTD., CHERTSEY, SURREY

Please send me your latest comprehensive catalogue

NAME .....

POSITION .....

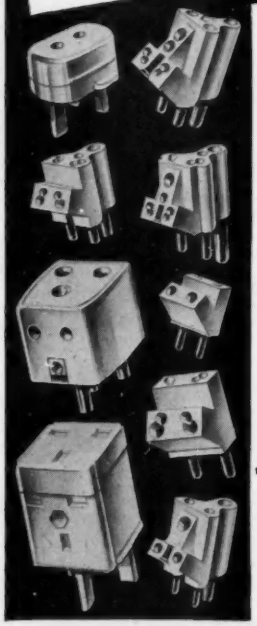
FIRM .....

ADDRESS .....

ER/11/58

Grelco

MULTI-PLUG ADAPTORS



The NEW 3 WAY ADAPTOR

List No. MW3/5/2

5 AMP 3 PIN

Specially designed so that the socket switch remains unobstructed and to give free access to all outlets irrespective of skirting board heights.

OUTLETS Top: 5 or 2 Amp 3 pin
Sides: 5 Amp 3 pin

GRELCO LTD

MINEHEAD · SOMERSET

Telephone: MINEHEAD 740

LONDON OFFICE: 123a Gloucester Road, South Kensington, London, S.W.7
Telephone: FREmantle 3371

The NEW PORTABLE TRANSFORMER

JD

HANG IT— OR CARRY IT!

Sizes available: 60, 120, 250, 500, 750, 1,000 V.A.

Secondary Voltages: 12, 25, 50, 110.

The Portable Transformer with the refinements you have always wanted:

1. **Panel mounting cartridge fuse holder incorporating two spare fuses.**
2. **Indented Metal Handle for hanging.**
3. **One, two, three or four Reyrolle Low Voltage Plugs and Sockets fitted as desired.**
4. **Rubber cable gland for incoming supply.**
5. **Robust Mild Steel Case, electrozinc coated prior to painting.**

JOHN DRUMMOND (Engineers) LTD.

Dalsholm Road, Glasgow, N.W. Tel: MAPyhill 3315

Designed Lighting

Harris and Sheldon hope to see
you at their Exhibition of
New Lighting Designs
and Fittings at the
Building Centre in November

Opening Times:

Monday 24th November
2.0 — 5.0 p.m.
Tuesday — Friday
9.30 a.m. — 5.30 p.m.

In support of the British Lighting Council Shop Lighting Campaign

Harris and Sheldon (Electrical) Ltd. HANDSLITE

RYDER STREET · BIRMINGHAM 4 · Telephone: CENTRAL 6272
London Office: 46 Gt. Marlborough Street W.1 · Telephone: GERrard 0869
Complete Lighting Specialists and Manufacturers of Lighting Fittings and Control Gear

SPUTNIK

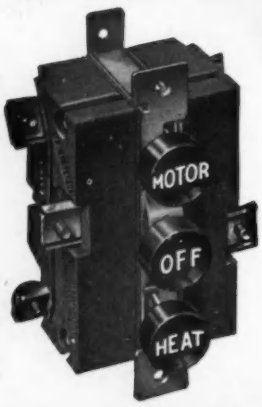
The very name Sputnik will cause to be released millions of pounds in the cause of Research and Development. Keep in step with these developments and use

BERYLLIUM COPPER "CRINKLE WASHERS"

Fabricated from Beryllium Copper Strip. The Washers are heat treated and plated. They are non-magnetic, and when plated are 100% corrosion resistant. They have a relatively high electrical conductivity, and will not damage highly polished and plated surfaces to be locked together.
It is used extensively by such industries as Radar, Television, Wireless, Aircraft and the Electrical and Electronics trade in general, and by most Government Departments.
It is approved by the British Admiralty Signal and Radar Establishment to their Spec. A.110000, also RAE/RSP.318 and by RCSC/RCL.224.
The Washers can be supplied, tested and released A.I.D. or A.R.B., and are also supplied in Good Commercial Quality.
A Custom Made Product of special interest to the Electrical and Electronic Industries.

DAVID POWIS & SONS LTD.
FORWARD WORKS · SPARKBROOK · BIRMINGHAM 11 · PHONE: VIC. 1264-8

FOR HEATED WASHING MACHINES



Jelson PRESS BUTTON SWITCHES ARE A

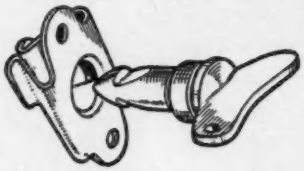
TECHNICAL ADVANCE WITH COMMERCIAL ADVANTAGE

Two AC only 15 amp 250 v D.P. Switches in one unit—ceramic insulation. Three varieties of operation—Independent, Interlocked sequence or Interlocked changeover. With or without manually reset Thermal trip for Heating Element and/or current overload trip for protecting Motor.

We shall be pleased to send full details.

JELSON ELECTRIC LTD. PHONE: ACO. 0866
SPRING ROAD, TYSELEY, BIRMINGHAM 11

ODDIE FASTENERS



The Fastener with endless applications. Simple, Positive, Self-locking. Made in a variety of types and sizes.

Special Fasteners to suit customers' requirements

WIDELY USED IN THE ELECTRICAL AND RADIO INDUSTRY

Department "E.R."

ODDIE, BRADBURY & CULL LTD.
SOUTHAMPTON

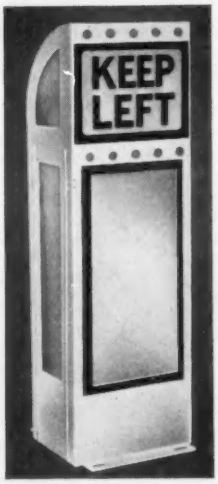
Telephone 55883 *Cables: "Fasteners, Southampton"*

NEW

PUBLIC BLEECO LIGHTING

Range of **ARUN**

Illuminated Bollards



These latest designs conform to the current M.O.T. Specification and are

- **INEXPENSIVE**
- **EASY TO CLEAN**
- **SIMPLE TO INSTALL**

Fuller Details and SAMPLES available on request

◀ BLEECO "ARUN ONE" Single-way Bollard (Also available TWO, THREE or FOUR WAY)

Fitted for 2–25 watt filament lighting or 2–6 watt MINIATURE FLUORESCENT TUBES and/or SODIUM LAMPS for "FOG"

BRIGHTON LIGHTING & ELECTRICAL ENGINEERING CO LTD.
35 Wellington Road, Brighton 7 *Telephone: Brighton 24661*

Porcelain Insulators

INSULATORS FOR
HIGH TENSION,
LOW TENSION,
REFRACTORIES
AND SPECIAL CERAMICS

JAMES MACINTYRE & CO. LTD.

WATERLOO ROAD, BURSLEM
PHONE: STOKE-ON-TRENT 87938

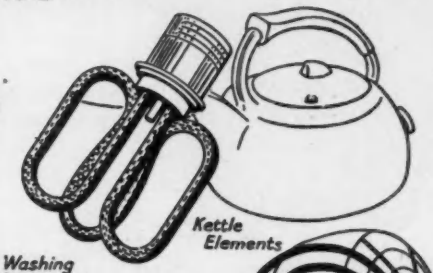
TETRA

TUBULAR SHEATHED ELEMENTS FOR DOMESTIC & INDUSTRIAL HEATING APPLIANCES

Selected by many of the leading manufacturers of domestic and industrial heating appliances for their high efficiency and economy, Tetra elements combine High Di-electric strength and Insulation Resistance with good Heat Transfer and Distribution.

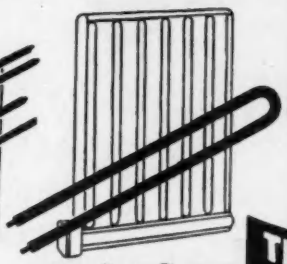
TETRA ROD ELEMENTS can be produced to customers' own requirements, and conform with British or Overseas Standards.

Washing Machine Elements

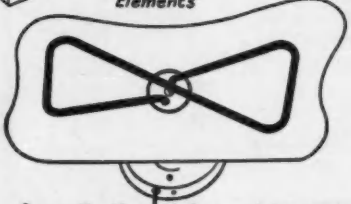


Kettle Elements

Water Heater Elements



Space Heater Elements



Space Heating Infra-red Elements

Fan Heating Elements

THE TETRA ENGINEERING CO. LTD
1-3 Redhill Street, London, N.W.1 Tel. EUSton 3707 PBX

Weir

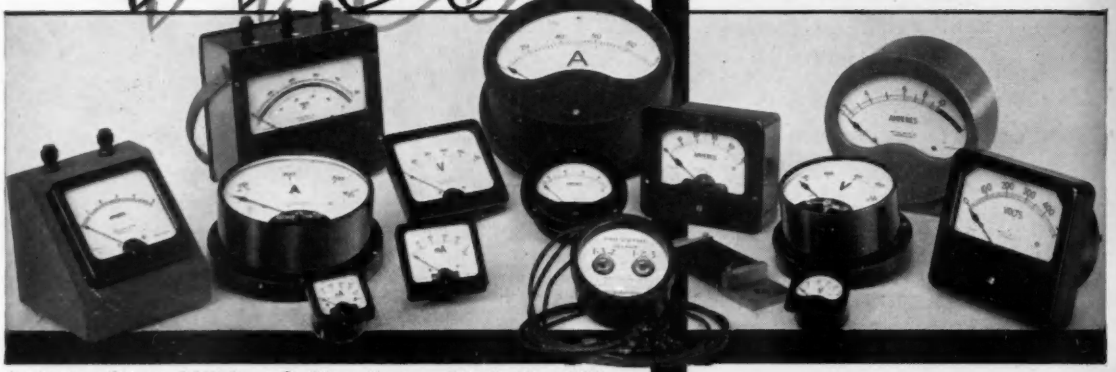
MANUFACTURERS OF ELECTRICAL INDICATING INSTRUMENTS AND ASSOCIATED EQUIPMENT

Miniature, Switchboard and Portable Instruments. Moving Coil, Moving Iron and Rectifier Types. Micro-ammeters, Milliammeters, Ammeters, Voltmeters, Frequency meters and Phase Sequence Indicators.

Special Shunts.

Transductors for the measurement of Heavy Direct Currents up to 20,000 amperes.

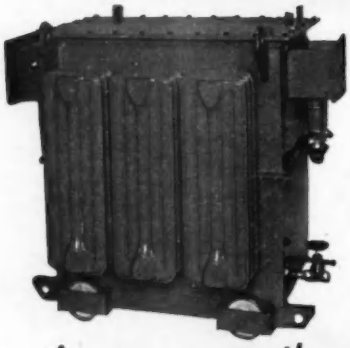
Gas and Oil operated relays for Transformer Protection, (Buchholz Principle).



London Area Office :— 2 Hill Street, St. Albans, Herts. Tel. : St. Albans 51722.
Manchester Office :— 270-272 Corn Exchange Buildings, Manchester 4. Telephone : Blackfriars 7795.
Midland Office :— 94 Victoria Road, Oxbarn, Wolverhampton. Telephone : Wolverhampton 33723.
Tyneside Office :— Alliance Buildings, 4 Mosley Street, Newcastle on Tyne 1. Telephone : Newcastle on Tyne 22877.

THE WEIR ELECTRICAL INSTRUMENT CO. LTD.
Head Office and Works : Bradford-on-Avon Wiltshire. Tel. : Bradford-on-Avon 2044/5.

It's a **STURDY** *transformer . .*



OVER 25 YEARS' MANUFACTURING EXPERIENCE

. . . in more ways than one

As supplied to Govt. Depts., National Coal Board, C.E.G.B. and many other large industrial undertakings.

From 500 VA to 150 kVA with special emphasis on the range 5 kVA to 150 kVA.

Sturdy ELECTRIC CO. LTD.

STURDY WORKS, HAMSTERLEY COLLIERY, NEWCASTLE UPON TYNE
Phone: EBCHESTER 271/2 Grams: Sturditran, Newcastle upon Tyne

TERMINAL BLOCKS

A full range
up to 12-way
5 amp.
15 amp.
30 amp.
45 amp.

Litholite Plastic Moulders since 1901

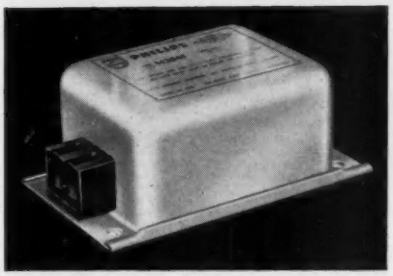
LITHOLITE Insulators & St. Albans MOULDINGS, LTD.
Sandown Road, WATFORD, Herts. Tel. WATFORD 4494

Another new development by **PHILIPS**– indestructible *polyester-filled ballasts*

Philips new polyester ballasts are a major advance in the lighting industry. At last, after years of ' making-do ', a ballast is now available which very closely approaches the perfection predictable in theory but so difficult to attain in practice. The list on the right summarises the many advantages of these revolutionary new polyester ballasts.

WITH POLYESTER FILLING

Philips polyester ballasts are filled with a new, specially prepared heat-setting thermoplastic material. This material, the product of years of research, comes close to the theoretical ideal for a filler material, so that these ballasts are – for all practical purposes – perfect.



INDESTRUCTIBLE
Solidly packed with heat-setting thermoplastic material.

LONGER LIVED
Because the filling does not soften with heat – *and cannot leak*. Unit is hermetically sealed against humidity.

LIGHTER & SMALLER
Improved, more compact design is possible with this new filler.

COOLER
Polyester filling is close packed in close contact to casing for better heat dissipation from windings. The special formula increases conductivity by a factor of *3 to 5*.

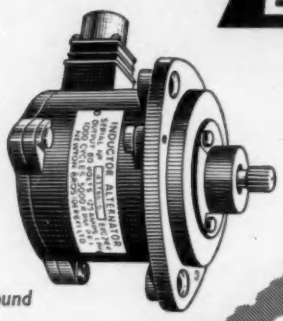
NOISELESS
Thermoplastic packing deadens vibrations.

EASIER ON TUBES
Philips polyester ballasts give constant output – tube life is no longer shortened by variations in current.

PHILIPS ELECTRICAL LTD · (LIGHTING DIVISION) PHILIPS CENTURY HOUSE · SHAFTESBURY AVE · LONDON WC2

(LD3133)

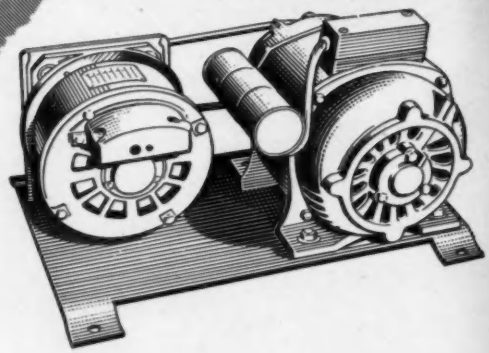
ELECTRICAL EQUIPMENT



10/20 VA 1000 c.p.s., 1 phase, 3000 r.p.m. wound field or permanent magnet excitation

Write for Illustrated Brochure

High Frequency Motor Alternator Set. 1kVA, 115 volts, 1600 c.p.s., single phase



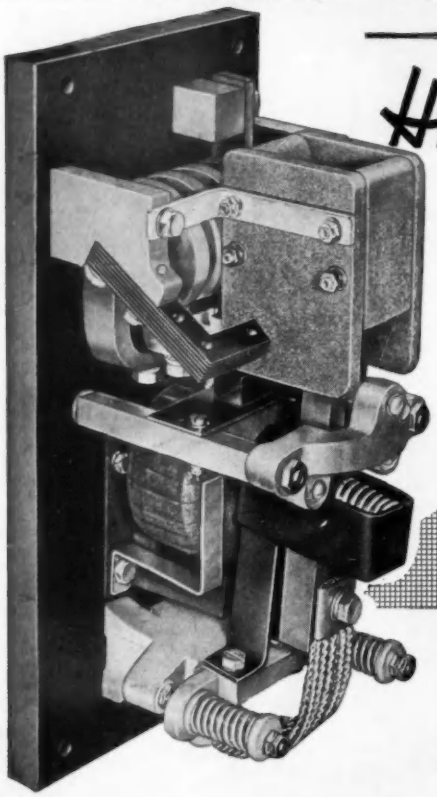
NEWTON DERBY

NEWTON BROTHERS (DERBY) LIMITED

ALFRETON ROAD · DERBY

PHONE: DERBY 47676 (4 LINES) GRAMS: DYNAMO, DERBY

London Office: IMPERIAL BUILDINGS, 56 KINGSWAY W.C 2



High Speed

CONTACTOR

HED

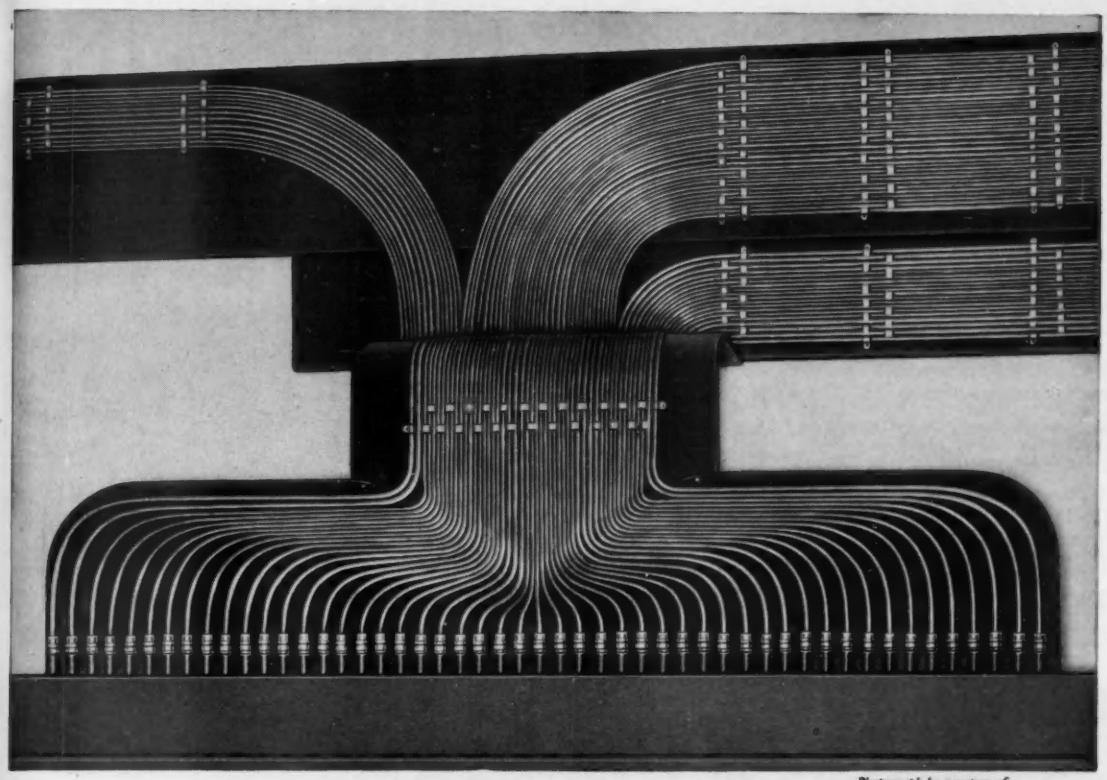
specially designed for continuous service under the most arduous conditions. Typical applications can be found in the field of **stud welding, spot welding, arc welding** and **aircraft starting units,** etc.

The heavy self-aligning contacts are provided with tipped faces suitable for the duty cycle requirements and provision is made for adjustment to compensate for wear. The magnetic blowout is exceptionally powerful, being responsible in no small measure for the high rupturing capacity of these contactors. The small overall dimensions are the outcome of compact design necessitated by the high-speed operating requirements of the welding field. Current ratings up to 1,200 amps. A.C. or D.C. are available. Write for leaflet

OTHER H.E.D. PRODUCTS : ★ *Precision Welding Machines* ★ *Rectifiers* ★ *Welding Controls* ★ *Saturable Reactors* ★ *Transformers* ★ *Coil Winding* ★ *Magnetising Equipment* ★ *Air-Conditioned Welding and Assembly Benches*

HIRST ELECTRONIC LTD.

GATWICK ROAD, CRAWLEY, SUSSEX · *Crawley* 25721-2-3



Photograph by courtesy of Messrs. Hawker Aircraft (Blackpool) Ltd.

A sound mechanical *job, good to look at, a 'Pyrotenax' installation costs less to install and is virtually everlasting.*

FACTORIES and Works, Laundries, Breweries.

ATOMIC PILE installations and Research Establishments.

ELECTRIC POWER STATIONS Oil Pumping and Storage Installations.

NON-AGEING • NON FIRE-CAUSING
SAFE AGAINST OVERLOAD • HEAT RESISTING
MOISTURE PROOF • RESISTANT TO
MECHANICAL MALTREATMENT • RUST PROOF

Pyrotenax
COPPER COVERED MI CABLES
PERFECTED BY EXPERIENCE

Write for full details and 'Technical Data No. D39'

PYROTENAX LIMITED
HEBBURN-ON-TYNE • Telephone: Hebburn 83-2244/8

CATHEDRALS, CHURCHES Galleries and Museums.

OIL TANKERS, Passenger and Cargo Ships, Warships.

LONDON: *ABBey 1654/5* • **BIRMINGHAM:** *Midland 1265* • **MANCHESTER:** *Blackfriars 6946* • **LEEDS:** *Leeds 27826* • **GLASGOW:** *City 3641/2* • **CARDIFF:** *Cardiff 23689*
GD39

Versatile HEAVY DUTY BOX FURNACES BY HEDIN

These furnaces are true maids-of-all-work. They are ideal for vitreous enamelling, annealing, case hardening, normalising, stress-relieving, or any metallurgical process. Fitted with atmosphere or vacuum containers they are equally good for bright annealing, degassing, copper brazing, sintering, etc.

- Maximum temperature 1150°C.
- Elements fitted in door, as well as walls, to ensure even temperature. Arranged for rapid heating
- Non-distorting hearth
- Highly efficient thermal insulation.
- Automatic temperature control
- Safety devices to cover all contingencies
- Easy maintenance

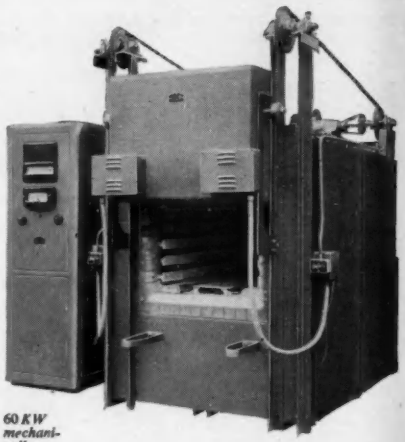
THE HEDIN RANGE OF FURNACES

Aluminium Brazing, continuous or batch; Aluminium Melting, bale-out or tilting; Sintering, to suit all temperatures; Continuous or batch annealing, with or without atmospheres; Forced Air Circulating; Steam atmosphere, arranged for rapid quenching; Special tungsten furnaces up to 2500 deg.C.; Glass annealing lehrs, continuous or batch; Ceramic Kilns up to 1400 deg.C., tunnel or batch; Carbon resistor furnaces up to 3000 deg.C.

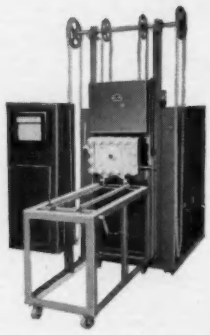
We shall be glad to send you full details of any of our furnaces on request.

HEDIN LIMITED INDUSTRIAL HEATING SPECIALISTS

Commerce Estate, S. Woodford, London, E.18. *Tel.: BUCkhurst 6601-3*



60 KW mechanically operated model. Internal dimensions 54" × 24" × 18"



Hand-operated model fitted with self-contained atmosphere equipment. With two or more containers the furnace can be kept in continuous production.

LIMIT SWITCHES

Compactness & Efficiency . . .

Send for our folder giving full details of dimensions and prices.

Type "V" Limit Switches are especially small and robust and fitted with silver butt type contacts, available with roller or plain plunger or dust and drip proof, in various switching sequences.

CRAIG & DERRICOTT LTD.

ROYAL WORKS, SUTTON COLDFIELD, Nr. Birmingham

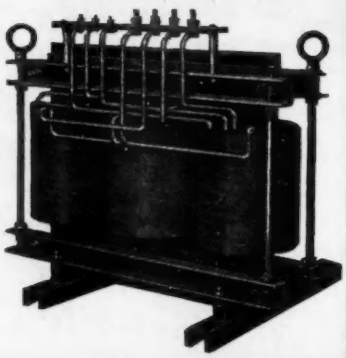
Tel.: Sutton Coldfield 2547

TRANSFORMERS

FROM 5 V.A.—

Single and Three-Phase, Air-Cooled, Enclosed and Oil Insulated Transformers to Customers' Specification.

SUPPLIERS TO :
MINISTRY OF WORKS, AIR MINISTRY, BRITISH TRANSPORT COMMISSION, CENTRAL ELECTRICITY GENERATING BOARD.



CAYSON

A.I.D. APPROVED

Send for List No. T.54

Prompt Delivery.

CAYSON ELECTRICS LTD : WATFORD

London Office: ANGEL HOUSE, LONDON, N.1.

TEL: TERMINUS 0566 7 TEL: WATFORD 7156 & 7177

HIGH BREAKING CAPACITY

DISTRIBUTION FUSEBOXES

WITH Aeroflex 60 AMP FUSES

Suitable for continuous outdoor use, this range of Fluvent High Breaking Capacity Distribution Fuseboxes has been developed for use on British Railways, Southern Region, and has been designed in conjunction with requirements stipulated by the Signals Engineer for the vital purpose of controlling electrically operated signal circuits.

The group consists of six 2-way and one 3-way D.P. 60 amp. aluminium-clad distribution boxes. Aeroflex High Breaking Capacity LDF Fuses have given excellent service over the years in other capacities, and it was decided to use this type of fuse rather than adopt a cheaper modern alternative of equivalent Breaking Capacity. It can be seen from the illustration that fuse-links are equipped with visible positive operation, non-explosive, indicators which show whether or not a fuse has been blown.

Parmiter Hope & Sugden Ltd.

FLUVENT ELECTRICAL WORKS LONGSIGHT MANCHESTER 12

London: 34 Victoria Street, S.W.1. Glasgow: 5 Somerset Place, C.3. Birmingham: 39/41 Carrs Lane, 4

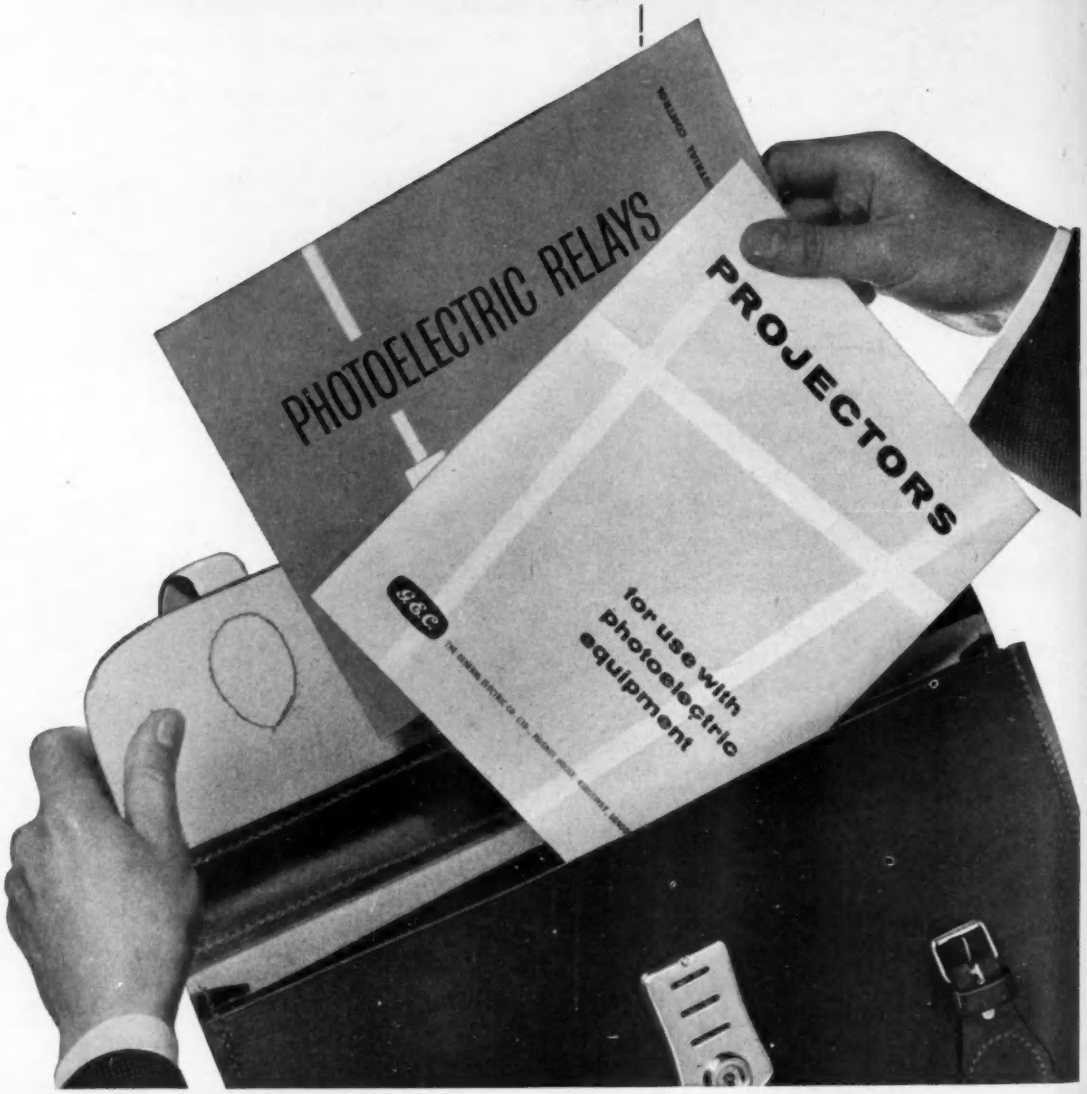
dm PH 146

G.E.C.

Photoelectric Equipment in control

G.E.C. Photoelectric Relays enable simple and efficient switching operations to be carried out merely by the interruption of a beam of light. Publications OV4177 & OV3729 describe the standard range of Photoelectric relays and ancillary equipment available from the G.E.C.

Send for these publications today



Write to the Valve & Electronics Department.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2.

Classified Advertisements

CLASSIFIED advertisements are PREPAID at 3/6 per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number there is an additional charge of 1/-.

DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Advertisements are accepted up to **first post on Monday** of the week of issue

If displayed with boxed rules, name or symbol block by **Friday** prior to week of issue

All communications to be addressed to:
Classified Advertisement Department,
ELECTRICAL REVIEW
Dorset House, Stamford Street
London, S.E.1

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Breadalbane Project

Electrical Services and Cabling for Lednock Power Station, Perthshire

TENDERS are invited for the Electric Lighting and Heating Installations, other wiring and cabling at the above power station.

Tender documents may be obtained from the Engineers, Messrs. Strain & Robertson, 5, Park Circus, Glasgow, C.3, on receipt of £2 2s. deposit (returnable).

The Board do not bind themselves to accept the lowest or any tender. 5521

SITUATIONS VACANT

NORTH WEST METROPOLITAN REGIONAL HOSPITAL BOARD

APPLICATIONS invited for the following posts :—

ASSISTANT ENGINEERS—
ELECTRICAL, MECHANICAL, HEATING AND VENTILATING.

Applicants must be at least (a) Graduate Members of the Institution of Electrical Engineers and have passed the Institution examination or recognised exempting examinations; or (b) Graduate Members of the Institution of Mechanical Engineers and have passed Sections A and B of the Associate membership examination, or recognised exempting examinations; or (c) Graduate Members of the Institution of Heating and Ventilating Engineers, and have passed the Associate membership examination, or recognised exempting examinations.

Salary scale £700 × £25 (3) × £30 (1) × £35 (6) to £1,015 plus £20-£50 London weighting.

ENGINEERING ASSISTANTS
(Grade II).

Applicants must have O.N.C. or other approved qualifications in appropriate engineering subjects.

Salary scale £525 × £20 (4) × £25 (5) to £730 plus £20-£30 London weighting.

Starting salaries in both grades may be above minimum having regard to relevant practical experience. Whitley Council conditions. Superannuable.

Apply, stating which post, and give age, qualifications (with dates) and experience, together with names and addresses of two referees to Secretary, North West Metropolitan Regional Hospital Board, 40, Eastbourne Terrace, London, W.2, by 3rd December. 5512

ASSISTANT MANAGER (POWER PLANT) required by the UNITED KINGDOM ATOMIC ENERGY AUTHORITY, Industrial Group, at Chapelcross Works, Annan, Dumfriesshire, Scotland, to be responsible to the Power Manager for the take-over, commissioning and operation of sections of steam and electric plant associated with four nuclear reactors.

A recognised engineering apprenticeship, corporate membership of a senior engineering institution, or equivalent, and wide experience of the operation of conventional thermal power plant are essential.

Salary between £1,300 and £1,740 according to qualifications and experience.

Contributory superannuation.

There is a staff housing scheme.

Send postcard for application form, quoting reference 2748, to Works Secretary at above address.

Closing date 1st December, 1958. 5492

DIPLOMATIC WIRELESS SERVICE

Foreign Office

APPLICATIONS are invited from qualified candidates to fill by competitive interview the following posts :—

1. ENGINEER/TECHNICIANS, Grades A and B and Grades 1 and 2. RADIO ENGINEERS are required for shift duties in Receiving and Transmitting Stations at home and abroad. Applicants should have experience in the maintenance of communication receivers and associated equipment and/or experience in the operation and maintenance of telegraphy transmitters and high-power broadcast transmitters, and should have technical knowledge to the standard of the C. and G. Final in Telecommunications or the H.N.C., or show evidence of an equivalent standard of technical education.

Grading according to qualifications and experience. Salary scales: Grade A, £1,235-£1,464; Grade B, £1,180-£1,325; Grade 1, £974-£1,180; Grade 2, £820 (at age 30 years) to £974.

Adequate allowances paid whilst serving overseas and in most cases families may accompany husbands to posts abroad.

2. ENGINEER/TECHNICIANS, Grade 3. RADIO ENGINEERS required for shift duties in Receiving and Transmitting Stations at home and abroad. Applicants should have experience in the maintenance of communication receivers and associated equipment and/or experience in the operation and maintenance of telegraphy transmitters and high-power broadcast transmitters, and should have technical knowledge to the standard of the C. and G. Intermediate in Telecommunications or its equivalent.

Adequate allowances paid whilst serving overseas and in most cases families may accompany husbands to posts abroad.

3. CONTROL ROOM ENGINEERS required for shift duties in the Radio Teleprinter Terminal in London. Applicants should have experience in the maintenance of teleprinters, V.F. telegraph and other line equipment, and have some technical knowledge of short wave radio propagation. They should have technical knowledge to the standard of the C. and G. Intermediate in Telecommunications or its equivalent.

4. CHARGEHAND RIGGER required at a Radio Station in Buckinghamshire. Applicants must have experience in the erection of steel and wooden masts up to 150 ft. in height and the rigging of aerial and transmission lines.

Salary Scale Grade 3, £655 (at age 26 years) to £820.

Candidates must be British subjects or citizens of the Irish Republic born within the Commonwealth or in the Irish Republic of parents born within these territories.

All first appointments are on a temporary basis with prospects of establishment. Candidates must be prepared to undergo a medical examination. The Department, which already employs a large number of ex-members of Royal Navy, Royal Signals, R.E.M.E. and the R.A.F., will welcome applications from qualified ex-service men who have served in technical units of H.M. Forces.

Write giving age, qualifications and experience to :—

The Chief Establishment Officer
Diplomatic Wireless Service
Foreign Office, London, S.W.1

5501

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

PLANT SHIFT CONTROL
ENGINEERS, CASTLE DONINGTON POWER STATION
(Vacancy No. 167/58/ER).

Experience desirable in control of boilers and turbines at high pressure and temperature, pulverised fuel, together with electrical control room experience.

Technical qualifications to Higher National Certificate desirable.

Salary will be in accordance with Class L, Grade 10 (£995-£1,055 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 26th November, 1958.

SHIFT CHARGE ENGINEER,
DERBY POWER STATION
(Vacancy No. 170/58/ER).

Applicants should have had a sound technical training and considerable experience in a modern power station. Preference will be given to candidates who are Graduate Members of the Institution of Electrical or Mechanical Engineers, or who hold similar qualifications. A knowledge of pulverised fuel firing will be an advantage.

Salary will be within Class F, Grade 7 (£885-£930 per annum) of the National Joint Board Agreement, plus 10% allowance for shift duties.

Closing date for receipt of applications, 26th November, 1958.

These appointments will be pensionable under the terms of the Electricity Supply (Staff) Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

O. S. WOODS,
Divisional Controller.

12th November, 1958. 5509

The Metal Industries Group of Companies

IGRANIC ELECTRIC CO. LTD.

a subsidiary company of the Group, announce the following vacancies :—

MOTOR CONTROL GEAR.

Vacancies exist for experienced application engineers and for young engineers who would like to train in this field. Work involves the design of contactor schemes for a wide range of industrial applications.

SERVO-MECHANISMS.

Vacancies exist for application engineers with experience in the design of closed loop systems incorporating magnetic amplifiers.

There is considerable scope for men with imagination and initiative.

Salaries paid will be commensurate with ability. Assistance may be given with removal expenses.

Apply in confidence with full particulars to PERSONNEL OFFICER, Igranic Electric Co. Ltd., Bedford. 5514

***Situations Vacant** (continued)*

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Norfolk Sub-Area

SUB-AREA HEADQUARTERS, NORWICH.

GENERAL ASSISTANT ENGINEER (120/58.R). Applicants should have had a sound technical training and possess the Higher National Certificate or equivalent qualification.

Salary N.J.B. K.17 (£590–£635).

Apply by letter to the Manager, Norfolk Sub-Area, Eastern Electricity Board, 4, Duke Street, Norwich, by 5th December, 1958.

GREAT YARMOUTH DISTRICT.

FOURTH ASSISTANT ENGINEER (121/58.R). Applicants should have had a sound technical training and some experience in the operation and maintenance or construction of H.V. and L.V. distribution systems, including substations.

Salary N.J.B. Class F, Grade 11 (£685-£730).

Apply by letter to the Manager, Great Yarmouth District, Eastern Electricity Board, Regent Road, Great Yarmouth, by 5th December, 1958.

Essex Sub-Area

SOUTH WEST ESSEX DISTRICT.

DEMONSTRATOR. Candidates should have had domestic science training including electrical housecraft, and should preferably hold the E.A.W. Certificate and be competent to plan and give cookery demonstrations including lectures and advice to consumers on the utilisation of domestic electrical apparatus. Previous experience in an electricity service centre is desirable.

Salary N.J.C. Grade 1 (£525 - £625) plus London allowance, although progress beyond £565 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade.

Apply by letter to W. T. Langfield, A.M.C.T., A.M.I.E.E., A.I.Mech.E., Manager, South West Essex District, Eastern Electricity Board, Ashton Road, Harold Hill, nr. Romford, Essex, by 5th December, 1958. 5537

YORKSHIRE ELECTRICITY BOARD

No. 5 (Wakefield) Sub-Area

WAKEFIELD DISTRICT

SERVICE CENTRE SUPERVISOR, Wood Street, Wakefield.

Applicants must be thoroughly experienced in service centre work including the sale of electrical appliances, hire purchase procedure, handling of consumer enquiries, display, and must be capable of advising consumers on any matters relating to electricity in the home. The successful applicant will be responsible for the internal organisation of the service centre and the control of staff. Suitable qualifications will be an advantage.

Salary N.J.C. Grade 4, £795/£25/£870 per annum.

ASSISTANT CONSUMERS' ENGINEERS (2 posts).

WAKEFIELD DISTRICT. Salary N.J.B. Class G, Grade 13, £635/£15/£680 p.a.

DONCASTER DISTRICT. Salary N.J.B. Class F, Grade 13, £590/£15/£635 p.a.

Applicants should preferably have had experience in negotiations for new supplies and in giving advice on supplies and tariff matters. They should have had experience in disputed accounts involving technical and metering problems and in assisting with street lighting negotiations. Knowledge in preparing schemes for proposed wiring installations and of industrial and agricultural equipment will be an advantage. Preference will be given to applicants holding the Ordinary National Certificate in Engineering.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 5th December, 1958. 5540

COMMONWEALTH OF AUSTRALIA

AUSTRALIAN DEFENCE SCIENTIFIC SERVICE

ENGINEERS

CIVIL, MECHANICAL & ELECTRICAL

The Weapons Research Establishment of the Department of Supply, Adelaide, South Australia, invite applications for positions of ENGINEERS.

SUPERVISING ENGINEER (Position No. 145—Permanent).
SALARY: £2171/2336.
DUTIES: Engineering planning for major missile trials in Australia.
QUALIFICATIONS: Educational qualifications acceptable for admission to the appropriate professional institute. Honours degree in Engineering (1st or 2nd class) preferred. Extensive experience in planning major engineering works.

SUPERVISING ENGINEER (Position No. 155 —Permanent).
SALARY: £2061/2226.
DUTIES: Supervise group engaged in design of radio, communication, timing, control and recording networks.

SENIOR ENGINEER (A number of Permanent and Temporary positions).
SALARY: £1841/2006.
DUTIES: Supervise sections engaged in design in the fields of communication, electrical, electronic, materials or mechanical engineering or direct the activities of one or more of the following workshops: Electrical, radio, electro-finishing, instrument or machine shop.

SENIOR ENGINEER (Position No. 157 — Permanent).
SALARY: £1841/2006.
DUTIES: Engineering planning for missile trials.
QUALIFICATIONS: Educational qualifications acceptable for admission to the appropriate professional institute. Honours degree in Engineering (1st or 2nd class) preferred. Experience in Engineering planning.

ENGINEER GRADE 3 (A number of permanent and temporary positions).
SALARY: £1506/1686.
DUTIES: Design in the fields of civil, communication, electrical, electronic, systems, materials or mechanical engineering or supervision in one of the following workshops: Electrical, radio, electrofinishing, instrument or machine shop.

ENGINEER GRADE 1 (A number of permanent and temporary positions).
SALARY: £966/1416.
DUTIES: Similar to those of Engineer Grade 3, but at a lower level.

QUALIFICATIONS: Minimum educational qualifications for all positions are those necessary to grant full exemption for corporate membership of the appropriate professional institute. Applicants for positions in the Electroplating shop may be qualified in chemistry or metallurgy in lieu of engineering. Applicants for Grade 3 or higher positions should have appropriate experience in one or more of the fields listed.
LOCATION: All positions are located at Salisbury, a suburb of Adelaide, with the exception of Grade 3 Communication Engineers who may be required to work for two (2) to three (3) years at Woomera.
NOTE: First class sea/air fare for appointee and dependants (wife and dependent children) will be paid under specific conditions by the Commonwealth. Assistance will be given in obtaining housing accommodation. (All salaries quoted are in Australian currency.)
APPLICATION forms obtainable from: Senior Representative (A.V.10/13), Department of Supply, Australia House, Strand, London, W.C.2, with whom applications should be lodged by 8th December, 1958. 5533

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts:—

Birmingham and District Sub-Area

DISTRICT MANAGER, Solihull District.

Applicants should have had a wide experience in managerial engineering, and commercial contracting and trading activities in the electricity supply industry. Salary in accordance with the N.J.M. Agreement, Class C, Grade 5, £1,900/£2,100 per annum.

Apply by letter, within fourteen days, stating age, qualifications, experience, present position and salary to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14, Dale End, Birmingham, 4.

Worcester and District Sub-Area

DEMONSTRATOR (Female), Redditch/Bromsgrove District.

Applicants must have had a good education and should have a Certificate of a recognised Domestic Training College and/or the E.A.W. Certificate. Some selling experience would be an advantage. Duties include lecture demonstrations in service centres and on consumers' premises and advice to consumers on the selection and use of electrical apparatus. Applicants must be prepared to take an active part in the sales organisation. Salary £500/£600 per annum (N.J.C. Grade 1).

Apply by letter, within fourteen days, stating age, education, qualifications, training and experience to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

A. STEPHENS, Secretary. 5536

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Division

Fourth Assistant Engineer (Power Plant Investigator)

APPLICATIONS are invited for the post of FOURTH ASSISTANT ENGINEER (Power Plant Investigator) to cover investigations of the metallurgical and associated aspects of steam power plant maintenance. This appointment will be on the Divisional Headquarters Staff and will involve work in various power stations in the North East.

The salary for the appointment (which is superannuable) will be in accordance with Grade 8, Schedule B of the National Joint Board Agreement (£710–£910) per annum, and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from Divisional Establishments Officer, Central Electricity Generating Board, North Eastern Division, Carliol House, Newcastle upon Tyne, 1, to whom they should be returned to arrive not later than 3rd December, 1958. 5525

ELECTRICAL CONTRACTING ESTIMATOR

required by well-known organisation for their London office; essential to have previous experience in the pricing of schedules for large Government contracts, public works and city blocks. Excellent opportunities of promotion in rapidly growing office; generous salary with superannuation. Assistance with removal expenses and house purchase where necessary. Apply stating age, apprenticeship and subsequent training and experience to—Box 5476.

BRADFORD INSTITUTE OF TECHNOLOGY

Principal: E. G. Edwards, Ph.D., B.Sc., F.R.I.C.

Readerships in Mechanical Engineering and Electrical Engineering

APPLICATIONS are invited for the positions of READER IN MECHANICAL ENGINEERING and READER IN ELECTRICAL ENGINEERING.

Applicants should possess the qualifications and experience to direct research and post-graduate work and to take a leading part in advanced teaching in Mechanical or Electrical Engineering.

The candidates appointed will be given adequate time to undertake and direct research and suitable technical assistance and equipment will be provided for them. They will have the opportunity of assisting the Heads of Departments in the planning of the new courses of advanced technology being undertaken by the Institute.

Senior members of the staff are encouraged to undertake consultant work in industry and may retain fees paid for such work.

The salary attached to the appointment is £1,550–£1,800 per annum.

In the case of a very highly qualified applicant the Governors may, subject to the approval of the Minister, pay such higher salary above the maximum of the scale as would be appropriate.

Previous industrial or research experience at a suitable level may be taken into account in fixing the commencing salary.

Further particulars and forms of application may be obtained from the Registrar, Bradford Institute of Technology, Bradford, 7, to whom completed forms should be returned not later than 6th December, 1958.

W. H. LEATHEM,
Clerk to the Governing Body.

5522

BERMUDA ELECTRIC LIGHT COMPANY LTD.

THE company have the following vacancies:

(a) ASSISTANT DISTRIBUTION ENGINEERS.

Applicants should have experience of the construction, operation and maintenance of both underground and overhead distribution at voltages up to 33 kV and 11 kV respectively.

They should not be more than 30 years of age and be Graduate Members of the I.E.E. and/or hold a Higher National Certificate in Electrical Engineering.

(b) TECHNICAL ASSISTANT FOR ELECTRICAL DEPARTMENT.

Applicants should have experience in the drawing office and mains records section of a supply authority, and experience as a construction draughtsman would be an advantage.

Their age should be preferably under 25 and they should hold Higher or Ordinary National Certificates.

The above posts are permanent, subject to satisfactory service, and in the first instance a three-year contract is offered. Salary will be in accordance with qualifications and a pension scheme exists. Free passages will be paid for successful applicants and families.

Apply in writing, stating age, education, qualifications and experience, to Messrs. Mackness & Shipley, Consulting Engineers, Parliament Mansions, Abbey Orchard Street, London, S.W.1. Replies for (a) above should bear the reference 2203/68 and those for (b) 2203/69.

5544

SOUTH EAST LONDON TECHNICAL COLLEGE

DEPARTMENT of Electrical Engineering (offering full-time "sandwich" and part-time courses and facilities for research). Required in January, ASSISTANT GRADE B; Burnham F.E. salary scale £650 × £25 to £1,025 plus London allowance; additions for training and qualifications; increments within the scale for experience.

Application forms from the Secretary of the College, Lewisham Way, London, S.E.4, returnable by 1st December, 1958. (2175) 5491

ELECTRICAL DESIGNER

required by

The Steel Company of Wales Limited (Steel Division)
in their Central Drawing Office at Abbey Works, Port Talbot

The successful candidate should have experience in heavy industry and be capable of preparing drawings for electrical drive installations including the layout of substations and contactor rooms. A knowledge of lighting and communications would be an advantage.

Higher National Certificate or equivalent desirable.

The position is permanent and pensionable.

Those wishing to apply should write giving full details of age, experience, qualifications, and any further information considered relevant to:

Superintendent, Personnel Services
THE STEEL COMPANY OF WALES LIMITED
(Steel Division)
Abbey Works, Port Talbot, Glam.

5532

SOUTH OF SCOTLAND ELECTRICITY BOARD

Ayrshire Area

Senior Assistant Engineer (Operation and Maintenance)

APPLICATIONS are invited for the post of SENIOR ASSISTANT ENGINEER (Operation and Maintenance) at Area Headquarters, Kilmarnock.

Applicants, who should preferably be chartered electrical engineers or hold equivalent qualifications, should have received a sound technical and practical training with comprehensive experience in the operation and maintenance of overhead and underground networks and substation equipment up to and including 33 kV.

The salary for the post, which is superannuable, will be in accordance with the National Joint Board Agreement, Schedule A, Class J, Grade 4, £1,325/£1,415 per annum.

The successful applicant will be required to reside within a reasonable distance from Area Headquarters, Kilmarnock, and a suitable house is available.

Applications, stating age, qualifications and full details of education, training, experience and present position, should be sent to the undersigned not later than 3rd December, 1958.

G. F. MOORE,
Manager.

Greenholm Street,
Kilmarnock.

5530

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER, Medway District.

Salary £885 × £15 to £930 under N.J.B. Class F, Grade 7. Superannuable.

The district has a considerable amount of varied industry, in addition to domestic and commercial loads. Candidates should preferably hold the Higher National Certificate or equivalent, and practical experience in the operation, maintenance and construction of 11 kV and medium voltage underground and overhead systems. Knowledge of the preparation of extension and reinforcement schemes an advantage.

Applications, quoting reference TER and naming two referees, to Medway District Manager, SEEBOARD, Gardiner Street, Gillingham, Kent, by 3rd December, 1958.

GEORGE WRAY,
Secretary.

5539

COUNTY BOROUGH OF EAST HAM

Housing Department

Clerk of Works (Electrical)

APPLICATIONS are invited for the above appointment. Salary in accordance with Grade APT. I (£575 × £30 to £725 per annum) plus London weighting.

Further particulars and form of application (returnable by 5th December, 1958) from the Town Clerk, Town Hall, East Ham, London, E.6. 5538

ROYAL NAVAL SCIENTIFIC SERVICE

SENIOR SCIENTIFIC OFFICERS and SCIENTIFIC OFFICERS required for establishments in London area, Baldock, Portsmouth, Portland, Poole, Greenock and Rosyth. Main requirements are about 25 vacancies for PHYSICISTS, ELECTRONIC ENGINEERS and MATHEMATICIANS in areas specified.

The following particular vacancies also exist: MECHANICAL ENGINEER for work on gas turbine problems in the London area. MECHANICAL ENGINEER for work on design and development of U/W devices in Portland area. METALLURGISTS for Rosyth and Poole. CHEMISTS (Physical and Inorganic) for Poole area, Baldock and London.

Candidates must normally be natural-born British subjects of natural-born British parents, with at least First or Second Class Honours degrees or equivalent high professional attainments. S.S.O.s must have had at least three years' postgraduate experience and be not less than 26 years of age.

Salaries (men): S.S.O. £1,190 - £1,410; S.O. £635-£1,110 (London); somewhat lower in Provinces. Appointments unestablished (with F.S.S.U. benefits), but opportunities may occur for those between ages of 21 and 32 to compete for established posts.

Forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A98/8A. 5164

JOSEPH LUCAS (ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

ELECTRICAL INDUSTRIAL HEATING

DESIGNING ELECTRICAL ENGINEER-TECHNICIAN - DRAUGHTSMAN required to assist director with development of heaters and elements and works management. Progressive opening throughout for keen young man with small progressive engineers, outskirts S.W. LONDON. Please write stating age, experience and present salary.—Box 5378.

Situations Vacant (continued)

CJB

ELECTRICAL ESTIMATOR

required by large contracting organisation. Experience in the preparation of tenders covering the following points essential: the installation of heavy electrical equipment, high and low-voltage underground and overhead transmission and distribution systems, wiring of industrial and flame-proof plants, etc.

First-rate conditions of employment, including non-contributory pension scheme.

Apply in writing to the Personnel Manager, Constructors John Brown Ltd., C.J.B. House, Eastbourne Terrace, Paddington, London, W.2. Please quote Ref. E. 9671.

5515

HERTFORDSHIRE COUNTY COUNCIL

HATFIELD TECHNICAL COLLEGE
Principal: Dr. W. A. J. Chapman, M.Sc.(Eng.)

TWO GRADE B ASSISTANTS required on 1st January, 1959, in the Department of Electrical Engineering.

(1) To teach Principles of Electricity to National Certificate students, and Electrical Installations Practice, Installation Regulations, etc., to City and Guilds students.

(2) To teach light current subjects to Diploma and Degree students, the emphasis being on Electronics.

The successful applicant for the first post should preferably be a Corporate Member of the Institution of Electrical Engineers, but this is not essential. Applicants for the second post should be Graduates and should preferably, in addition, be Corporate Members of the Institution of Electrical Engineers.

Salary for both posts £650 × £25 to £1,025, with additions for qualifications and industrial experience.

Applications should be sent (no forms) to the Registrar, giving full details of qualifications, industrial and teaching experience, by the 30th November, 1958. 5524

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division
Vacancy No. 122/ER/58

APPLICATIONS invited for the superannuable N.J.B. position of ASSISTANT ENGINEER (Combustion and Efficiency), CARDIFF POWER STATION.

Salary F.7, £885–£930 per annum.

Applicants should preferably have obtained H.N.C. and served a regular apprenticeship. Power station experience and knowledge of automatic combustion control equipment desirable.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 8th December, 1958. 5534

ELECTRICAL CONTRACTORS' MANAGER, LONDON

APPLICATIONS are invited for this SENIOR POSITION by nationally known Company. Applicants should have experience with electrical contracting firm of estimating and supervision of contracts; ability is required in handling staff, general administration and in meeting executives; some commercial experience an advantage. Excellent salary and prospects in rapidly growing organisation; generous superannuation.

Apply stating age, experience and any technical qualifications to—Box 5477.

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London allowance. Qualifications entitling to Graduate Membership of I.E.E. or I.Mech.E. an advantage.

ASSISTANT SHIFT CHARGE ENGINEER, BATTERSEA POWER STATION (Vacancy No. 58/943).

Good technical training with experience of large power station operation. Duties will include relief for Shift Charge and Assistant Shift Charge Engineers. Salary Class L, Grade 8 = £1,210 plus £116 shift p.a.

ASSISTANT ENGINEER (Instruments), BRUNSWICK WHARF POWER STATION (Vacancy No. 58/944).

Sound technical training with experience of steam and water instrument maintenance, including automatic boiler control equipment. Salary Class K, Grade 12 = £885 p.a.

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 1st December, 1958. 5510

CANADA

ENGINEERS AND TECHNICIANS

Salaries $7,200 - $9,000 per annum

COMMUNICATIONS
CARRIER SYSTEMS
RADAR
RADIO RELAY SYSTEMS

A well-known expanding Canadian company has immediate vacancies for men experienced in the installation and maintenance of radar and communication systems for work in remote and isolated areas of Canada.

Candidates of H.N.C. standard or equivalent experience would be most suitable.

Interviews will be arranged at once in this country. Please write giving full details to E.R.—

Box 5542.

JOSEPH LUCAS (ELECTRICAL) LIMITED

ASSISTANT ELECTRICAL DESIGN ENGINEER

required for the design of rotating electrical machines and electro-magnetic devices. Projects will include fundamental design investigations, and full scope will be given for initiative and imagination.

The post is permanent and pensionable.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Limited, Great King Street, Birmingham, 19, quoting reference PM/D/221.

125

BICC

PHYSICIST or ELECTRICAL ENGINEER, graduate, preferably of honours degree standard, required for the Shepherds Bush (London) research laboratories of British Insulated Callender's Cables Limited.

The work involves research and development on dielectrics and capacitors. Previous experience in this field would be desirable but is not essential.

Five-day week; pension fund.

Applications giving details of age, qualifications and experience to be made to Personnel Officer, BICC Ltd., 38, Wood Lane, London, W.12.

5499

CENTRAL ELECTRICITY GENERATING BOARD

Eastern Division

APPLICATIONS are invited for the following appointment:—

ASSISTANT SHIFT CHARGE ENGINEER, CLIFF QUAY GENERATING STATION.

Salary Class K, Grade 9, £995 × £20 to £1,055 per annum, plus 10% shift allowance.

Applicants should have served an apprenticeship and obtained an Ordinary National Certificate in Electrical and/or Mechanical Engineering, or equivalent. Preference will be given to applicants who have had experience in the operation of generating station utilising pulverised fuel.

Applications, quoting Reference No. 2/9895, stating age, qualifications, experience and present position, should be sent to the Controller, Central Electricity Generating Board, Eastern Division, West Farm Place, Chalk Lane, Cockfosters, Barnet, Herts., to arrive not later than 29th November, 1958.

W. N. C. CLINCH,
Controller. 5511

THE POLYTECHNIC
309, Regent Street, London, W.1

ELECTRICAL ENGINEERING DEPARTMENT

APPLICATIONS are invited for a post as FULL-TIME LECTURER in Electrical Engineering, to take up duties as soon as possible.

Candidates should possess a University Degree in Engineering or equivalent qualification and have had suitable industrial experience. Ability to teach Electric Power or Machines subjects up to the standard of the final B.Sc(Eng.) and Diploma in Technology examinations will be an advantage.

Salary in accordance with the Burnham (Further Education) Scale for Lecturer, viz., £1,200 × £30 to £1,350 plus London allowance of £36 or £48 per annum.

Further particulars and application form to be returned not later than 29th November, 1958, may be obtained from the undersigned.

J. E. RICHARDSON,
Director of Education.

5529

A.E.R.E., HARWELL

Reactor Operations

APPRENTICED or similarly trained technical officers are required to assist in the shift operation of high flux experimental reactors and experimental equipment. Experience (a) of operating or maintaining marine or land-based power plants or chemical plants is required; (b) of instrumentation or process control would be helpful. An appropriate National Certificate is desirable.

Salary £875–£1,050 (Tech. II).

Housing and superannuation schemes.

Please send a POSTCARD to the Group Recruitment Officer (1252/48), U.K.A.E.A., Atomic Energy Research Establishment, Harwell, Berks., for details. 5490

CITY OF BRADFORD

City Architect's Department

APPLICATIONS are invited for the permanent post of ELECTRICAL ENGINEERING ASSISTANT, Grade A.P.T. II (£725 × £30 to £845 per annum).

Candidates should hold a Higher National Certificate in Electrical Engineering or similar qualification.

The successful applicant will be required to assist in the preparation of estimates, surveys, new schemes and specifications, and to supervise, inspect and test electrical work undertaken by the department.

No assistance can be given in the provision of housing accommodation.

Application forms obtainable from the City Architect, Town Hall, returnable with copies of two recent testimonials by 29th November, 1958.

W. H. LEATHEM,
Town Clerk.

Town Hall,
Bradford, 1. 5523

ASSISTANT WORKS MANAGER

required by a progressive electrical engineering organisation in the West of Scotland. The vacancy will appeal to a man with a sound basic and technical education, with experience in executive management, and who is looking for a first-class opportunity where he will rise and be rewarded on the results he produces in a virile and progressive organisation.

The intention is that he will be promoted to Works Manager as early as possible. A salary will be paid commensurate with this post and qualifications held, which should be a Higher National Certificate or the equivalent. The preferred age is 35-45 years.

Applications, which will be treated as absolutely confidential, should be sent to the Personnel Officer.—Box 5474.

AIR MINISTRY WORKS DESIGN BRANCH

requires in LONDON and PROVINCES

ELECTRICAL ENGINEERING DRAUGHTSMEN

experienced in preparation of schemes for illumination and electrical equipment of buildings or in electrical distribution, H.V. and M.V. Technical training to O.N.C. standard or equivalent an advantage.

Salaries in LONDON up to £1,015 p.a. Somewhat lower in PROVINCES. Starting pay dependent on age, qualifications and experience. Long-term possibilities with promotion and pensionable prospects.

5-day week; 3 weeks 3 days leave a year. Liability for overseas service. Normally natural-born British subjects.

Write stating age, qualifications, employment details, including type of work done, to any Employment Exchange, quoting Order No. Borough 104. 399

ELECTRICAL ENGINEER

wanted by leading German manufacturer for German-English translations. Applications are invited from British-trained engineers with a good general education and sound technical training, preferably also with practical experience in the application of electric equipment. Good working knowledge of German is essential. The ability to write clearly and concisely will be expected of candidates.

A five-day week is worked with generous holidays. Favourable housing conditions for permanent staff.

Apply, stating age, education, qualifications, experience and salary required, to—Box 5365.

OVERHEAD LINESMEN

OVERHEAD LINESMEN and CHARGE-HAND OVERHEAD LINESMEN required in South Wales area. Write stating age, and giving details of previous experience to—Box 5416.

UNIDARE LIMITED

Finglas, Dublin, Ireland

has a vacancy for

DISTRIBUTION TRANSFORMER DRAUGHTSMAN.

Applicants should have experience in the draughting of transformers up to 1,500 kVA.

This appointment will carry an attractive salary with the benefit of non-contributory staff pension scheme and a contributory health insurance scheme.

Apply, quoting reference BGC/DON/MS, giving full details of experience. 5527

COUNTY OF ESSEX

APPLICATIONS are invited for the post of INSTRUCTOR IN ELECTRICAL INSTALLATION WORK at Chafford School, Ramsey, Harwich, an Approved School for 91 boys, to develop a training course for group of boys 14-16 years of good intelligence.

Candidates should possess a full technological certificate of the City and Guilds of London Institute (or equivalent) covering Electrical Installation work and have appropriate industrial experience.

Salary according to qualifications and experience within the scale of £575 × £25 to £1,000 per annum, less £120 per annum, if resident (single accommodation only). Additional payment of £180 per annum for 15 hours supervisory duty a week.

Apply Children's Officer, 224, London Road, Chelmsford. 5531

CENTRAL ELECTRICITY GENERATING BOARD

Southern Division

SEC/3.3

ASSISTANT ENGINEER (Efficiency), SOUTHAMPTON GENERATING STATION.

Applicants should have had appropriate experience in a generating station and should preferably possess qualifications leading to Corporate Membership of a recognised professional institution.

Salary N.J.B. F/7, £885-£930.

Special application forms, obtainable only from P. D. A. Oliver, Divisional Secretary, Central Electricity House, High Street, Portsmouth, should be returned by the 3rd December, 1958. 5535

DOWDING & MILLS LTD.

24, White Post Lane, London, E.9

Engineer Representative

LEADING electrical repair specialists require, due to their London branch expansion, an ENGINEER REPRESENTATIVE of good personality, drive, initiative, and who is prepared to work hard for future rewards.

Experience in electric motor repair or manufacture preferable but not entirely essential.

Good basic salary, bonus, pension scheme and company motor car provided.

Applications, which will be considered in the strictest confidence, to be addressed to the London Sales Manager. 5528

HEAD WRIGHTSON IRON & STEEL WORKS ENGINEERING LTD.

ELECTRICAL ENGINEER

required for Resident Engineer's Staff on large development contracts in the iron and steel industry. Applicants should preferably be Chartered Electrical Engineers, with suitable experience of installation work.

Applications should state age, experience, qualifications and salary required to—Personnel Manager, Ref. I.S./21, Teesdale Iron Works, Thornaby-on-Tees.

5516

CENTRAL ELECTRICITY GENERATING BOARD

APPLICATIONS are invited for appointments as ASSISTANT SHIFT CHARGE ENGINEERS at BRADWELL, BERKELEY or HINKLEY POINT NUCLEAR POWER STATIONS.

Candidates should have the necessary technical qualifications for admission to corporate or graduate membership of a senior engineering institution, and experience in a modern conventional power station. The successful applicants will be given a course of theoretical and practical training, expected to last approximately six months.

Salary within range £1,235-£1,325 p.a.

Application form obtainable from I. G. Ellis, Personnel Officer, 24-30, Holborn, London, E.C.1, to be returned by 5th December. Please mark envelope "Confidential ER/347." 5500

M.K. ELECTRIC LIMITED

REQUIRE EXPERIENCED SALES

REPRESENTATIVE

FOR NORTH EAST ENGLAND

If you have experience in dealing with architects, electrical wholesalers and contractors, are a car owner and would like to join the sales team of a progressive company marketing products with a world-wide reputation, we would like to hear from you in confidence.

Write in the fullest detail to:—

The Sales Manager
M.K. ELECTRIC LTD.
London, N.18

5392

SOUTHERN ELECTRICITY BOARD

Assistant Engineer (Planning)

Reading District of No. 2 (Newbury) Sub-Area. Salary N.J.B. Class J, Grade II (£835-£880 per annum). N.J.B. conditions of service.

The duties of the post will be to assist the planning engineer in the preparation of schemes and estimates for extensions of and reinforcement to overhead and underground H.V. and L.V. networks, and to undertake standby duties if required. Suitable technical qualifications are necessary.

The successful candidate will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Road, Newbury, and returned to him, quoting Z.964, not later than 1st December, 1958. 5541

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

CONSUMERS' ENGINEER required in the Warrington District. Salary within range £885/£930 per annum (N.J.B. G/8).

The duties of the post will include estimating for contracting work, advising consumers on matters relating to electricity supply and the utilisation of electrical equipment, and general technical administrative assistance.

Applicants should have received an engineering training, and be Graduate Members of the Institution of Electrical Engineers.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway House, Northwich, Cheshire. Closing date 3rd December, 1958. 5513

CENTRAL ELECTRICITY GENERATING BOARD

South Wales Division

Vacancy No. 120/ER/58

APPLICATIONS invited for superannuable N.J.B. appointment of ASSISTANT SHIFT CHARGE ENGINEER at USKMOUTH POWER STATION, NEWPORT, MON.

Salary K.8, £1,065 to £1,140 per annum.

Experience in modern generating station essential; appropriate engineering qualifications and regular apprenticeship desirable.

Special application forms obtainable from Secretary, South Wales Division, Central Electricity Generating Board, Twyn-y-fedwen Road, Gabalfa, Cardiff, to be returned by 3rd December, 1958. 5526

***Situations Vacant** (continued)*

DORMAN LONG (STEEL) LTD.
require a working
CHARGEHAND ARMATURE WINDER
at their new Lackenby Works, having sound knowledge of all A.C. and D.C. windings, including equipment used in steelworks, and rolling mill drives up to 8,000 h.p.

Send fullest details to LABOUR OFFICER, LACKENBY WORKS, GRANGETOWN, MIDDLESBROUGH. 80

SALES MANAGER
with knowledge of the
ELECTRICAL TRADE
required to develop sales force of small but imaginative company manufacturing and holding important patents for lighting equipment.

Excellent and immediate opportunity for young man with initiative.

Write in first instance to—Box 5546, giving, in confidence, details of experience and age.

A SENIOR POSITION
exists in the Sales Dept. of a large firm manufacturing electric motors. The position offers exceptional prospects for advancement. Good theoretical and practical training and subsequent sales experience essential. Preferable age 30 to 35. Apply in confidence stating age, experience, qualifications and salary.—Box 5448.

A CHARGE hand for expanding electric motor repair works. Experience of all types of winding and fitting including outside service. Able to drive. Good rate and opportunity for keen and industrious man.—Lewis Electric Motors Ltd., Moor Works, Blackamoor Lane, Maidenhead, Berks. 5547

AGENTS for well-known continental electrical engineering firm are looking for one or two technical assistants in their sales department. Applicants should have knowledge of technical German and be able to read the language. Speaking or writing is not required. Age between 25 and about 40 years. Write with full details of education (H.N.C.) and experience to—Box 5475.

APPLICATIONS are invited for the position of sales representative in the London area. Experience of domestic heating equipment and sound connections with area electricity boards, electrical wholesalers and retailers is essential. Good salary and contributory pension scheme. Write giving age, and details of education and experience to—Ekco Heating, E. K. Cole Ltd., 5, Vigo Street, London, W.1. 5545

ASSISTANT works manager required. Must be conversant with electric lamp manufacture. Also vacancy for foreman with knowledge of sealing, stem making or pumping. Replies treated in strictest confidence.—Luxram Electric Limited, Knight Road, Strood, Kent. 9542

AUTOPHONE Ltd. require telecommunications engineer capable of assisting in developing automatic and loudspeaking telephone equipment. Ability to write technical descriptions desirable. Good salary, prospects and working conditions. Write with brief details to—Autophone Ltd., 539, Wandsworth Road, London, S.W.8. 5367

BRUCE PEEBLES & Co. Ltd. have a vacancy for a technical sales engineer in their rotating plant sales (quotations) department. Five-day week, staff pension and production bonus schemes; assistance with removal expenses and house purchase where necessary. Applications stating age, qualifications and experience to Manager, Rotating Plant Department, Bruce Peebles & Co. Ltd., Engineers, Edinburgh, 5, quoting reference FH/Sales. 5548

COMPETENT chargehand required by light engineering company in the Slough area, for department engaged in winding small A.C. and D.C. motors. Write giving full details of past experience to—Box 5549.

DEPARTMENT OF HEALTH FOR SCOTLAND. Clerk of works, engineering. Pensionable post for man at least 25 on 1.10.58. Qualifications: 5 years' apprenticeship plus 3 years' experience in engineering trade; experience in maintaining steam plant, heating and electrical installations. National Certificate in Mechanical or Electrical Engineering or M.T.C.A. Certificates (Steam) an advantage. Salary £720 (at age 25) to £845 (30 or over) rising to £1,002. Write Establishments Officer, Department of Health for Scotland (Room 30), St. Andrew's House, Edinburgh, 1, for application form. Closing date 12th December, 1958. 5478

DESIGNER draughtsman. Due to expansion, opening occurs for better than average engineer to join enterprising and enthusiastic team in design, pricing and site execution of electrical installations for all classes of buildings. Creative mind and accuracy essential for this interesting and high calibre work. Write full particulars of experience, age, training and salary required—(M.D.), Alliance Electrical Co. Ltd., 2, Henrietta Street, London, W.C.2. 65

DRAUGHTSMAN, senior electrical, required by leading electrical contractors, London, S.W. Experienced in preparing installation layout and record drawings, builders' holes details, connection diagrams, etc. Knowledge of installation design advantageous. Two junior draughtsmen already employed. Five-day week. Please state in confidence age, experience and salary required to—Secretary, Box 5480.

ELECTRIC lamp manufacturer has vacancies for representatives in Lancashire and in the Midlands. Replies with full details of experience, age, salary required to—Box 9544.

ELECTRICAL and radio distributor has vacancies for progressive men aged 25/45, capable of accepting responsibility and with comprehensive knowledge of all aspects of electrical wholesaling. Apply in first instance stating age and full details of experience to Managing Director, The Wholesale Fittings Co. Ltd., 46/52, Commercial St., London, E.1. 5355

ELECTRICAL draughtsman required for consultants' office to work on preparation of electrical design drawings and specifications for power and lighting installations, covering all types of commercial and industrial buildings. Site visits and opportunity for early advancement to engineer status. Good commencing salary. Please apply in writing stating age, experience and salary expected to—A. F. Myers & Partners, 147, Victoria Street, London, S.W.1. 5449

ELECTRICAL installation inspector required by consulting engineers (Manchester). Duties primarily visiting sites during construction and inspecting and reporting upon electrical contractors' progress and quality to a specification; also testing. Applicants must be conversant with and able to interpret building and electrical drawings, should have considerable practical experience of high standard contracting work in large offices, hospitals and schools, etc., and have ability to make neat, concise and accurate reports. Salary according to experience, etc., but position is pensionable and includes travelling and car allowances. Applicant must therefore hold current driving licence. Age 30-45 years. Apply giving fullest possible information of experience and education to—Box 5493.

ELECTRICAL, mechanical engineer/draughtsman, experienced in estimating and supervising manufacture of electrical equipment for the printing trade. Knowledge of costing an advantage. N.W. London. Apply giving full details of experience and state salary required to—Box 5370.

ENGINEER, experienced steel tower work and foundations essential. Good prospects. Electrical engineers and contractors. Pension scheme.—Box 5503.

ESTIMATING engineer. Experience of motor control gear, sequence, auto control and ancillary gear essential. Opportunity for man with experience and ability; pension scheme; 5-day week. Applicants should supply details of experience and present salary to the Managing Director, British Klockner Switchgear Ltd., Chertsey, Surrey. 5413

HARRIS & SHELDON (ELECTRICAL) Ltd. require lighting engineers to cover Scotland, the West Midlands, Bristol and South Wales and London areas. These positions demand men able to conceive and present lighting schemes and capable of dealing at senior executive level with particular regard to multiple and departmental stores. A substantial starting salary, together with expenses, pension scheme and a car, is offered. Comprehensive details of experience, etc., in confidence to — Sales Manager, Harris & Sheldon (Electrical) Ltd., 46, Great Marlborough St., London, W.1. 5504

INSTALLATION estimator-designer engineer for old-established electrical contractor handling large commercial, municipal and industrial schemes. Location West London. Interesting prospects for well qualified, experienced and capable man. Please give comprehensive personal information, in guaranteed confidence, to Managing Director.—Box 5488.

EVERSHED & VIGNOLES require for their sales contracts a young engineer to process servo motor and allied equipment orders. O.N.C. electrical engineering standard. Write Instruments Manager, Acton Lane Works, London, W.4. 5494

INSTRUMENTATION. A vacancy exists in a modern post-war factory for a technically trained man to co-ordinate progressive instrumentation policy. Work will include new installations from planning and design to full operation, co-ordination of calibration and maintenance of existing instruments, and training operatives to use these instruments. The section is now small but scope for the future is large. The successful applicant should be familiar with process control theory and the use of pneumatic controllers. Some knowledge of electronics would be helpful. Please reply to—Box 5551.

JUNIOR estimator required for large electrical contractors, S.W. London. Experience of large housing and flat installations essential. 5-day week. Full details age, experience and salary required to—Box 5453.

LEADING East African merchants require sales manager to be responsible for the development of business in domestic radio receivers and allied lines. While the main need is for a man with a flair for selling and with a good record in this field, servicing experience is essential as it will be necessary to establish and supervise service depots. Commencing salary not less than £1,500 per annum. Contributory pension fund and medical expenses scheme, partially furnished accommodation or allowance in lieu thereof, and free passages for employee and family. Optional tours of two or four years' duration with U.K. leave on full pay.—Box 5414.

LONDON TRANSPORT require testing engineers. Applicants should be experienced in the commissioning and maintenance of either electrical protection equipment and metering gear, or substation remote control apparatus, and hold a technical qualification of at least Higher National Certificate standard. Duties include control of staff engaged in one or other of the classes of work referred to above, reporting on progress of installation and maintenance work, and preparation of network calculations. Salary range £965 p.a. to £1,025 p.a. Medical examination; free travel; contributory superannuation scheme after probation. Applications within 7 days to Staff and Welfare Officer (F/EV 714), London Transport, 55, Broadway, London, S.W.1. 5543

MANAGER, experienced sales and electrical installations. Sussex area. Good prospects. 30-35. Pension scheme.—Box 5502.

MANAGING director of well-known public company requires a personal assistant with following qualifications: Age not over 40. Electrical engineering background, preferably graduate standard. Some commercial success already achieved. Prepared to live in North-West area, near Manchester. The successful applicant will be engaged in the various divisions of the company with a view to being made a general manager and then a director. This post is one for top quality men only who have already had some commercial success but feel they can improve their present position.—Box 5517.

MOORLITE fluorescent fittings. An experienced lighting salesman is sought who will exclusively handle these products in Yorkshire on behalf of sole distributors, G. A. Nicholas Ltd., Morley. Salary by arrangement. Car provided. Replies to — Managing Director, G. A. Nicholas Ltd., 28/30, Bridge Street, Manchester, 3. 5550

REQUIRED immediately, electrical detail draughtsman with Ordinary National Certificate and with some experience of abstracting quantities from scheme drawings; age 22-25; 5-day week, pension scheme, generous holiday allowance. Apply in confidence to W. S. Atkins & Partners, 52, Frederick Road, Edgbaston, Birmingham, 15. 5552

SALES department of a firm manufacturing electric motors has a vacancy for a young electrical engineer at their Glasgow office. The position offers good opportunities for a permanent and progressive position. Reply stating age, experience and qualifications to—Box 5520.

SALES engineer required for London and Home Counties by electric motor and geared motor manufacturers.—Box 5495.

SALES engineer to promote and develop the sale of industrial plugs and sockets and switchgear in the West of England, based on Bristol. Salary, expenses, car allowance, pension scheme. Similar opportunity in Lancashire, based on Manchester. Full details of qualifications and experience in confidence.—G. M. Sloan Electrical Co. Ltd., 240/250, Ferndale Road, London, S.W.9. 5518

SENIOR draughtsmen required in West Country. Must have design experience of either components such as contactors, relays, etc., or of complete automatic control and/or switchgear installations. Knowledge of the requirements of the British Admiralty or of Lloyds, etc., for marine equipment an advantage. Pay in accordance with experience but above A.E.S.D. minimum. Good and congenial working conditions; varied and interesting work. Apply in confidence—Box 5454.

TECHNICAL sales correspondent required with practical experience of small transformers and their application. Opportunity for use of own initiative. Apply in writing to—Personnel Manager, F. C. Heayberd & Co. Ltd., 114, Greenwich South Street, London, S.E.10. 9548

THE BRITISH THOMSON-HOUSTON Co. Ltd. has vacancies in its research laboratory at Rugby for electrical engineering graduates for work concerned with electrical insulations. There are also vacancies in the same group for men with National Certificate or similar qualifications. Applicants are invited to write to the Director of Research, The British Thomson-Houston Co. Ltd., Rugby, stating age, and giving full details of education and experience, and quoting reference MIR. 5496

TRANSFORMER engineer required by the British Electric Transformer Co. Ltd. for tendering and technical correspondence. Applicants must be fully experienced in this class of work and should be educated up to H.N.C. standard. Full particulars of age, experience and salary required to the Personnel Officer, The British Electric Transformer Co. Ltd., Hayes, Middx. 5345

YOUNG technical electrical engineer for contracts dept., having experience with electric motors and control gear. Very good prospects. North London. Please send full details age, experience, salary required, etc., to—Box 5497.

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

A.M.I.E.E.(43), wide knowledge indusl. electn., light elect. eng., seeks posn. elect. engr. or tech. sales (not London).—Box 9547.

ELECTRICAL engineer, A.M.I.E.E. (46), resident N. London, seeks responsible post London area with consultants or contractors. Many years' experience design, specifications, administration in oil and chemical industries, of complete power and lighting installations and H.V. and L.V. distribution schemes.—Box 9545.

ELECTRICAL engineer, experienced in running diesel stations and distribution systems up to 33 kV, desires further senior position overseas.—Box 9529.

ELECTRICAL engineer, Grad. I.E.E., Grad. I.Mech.E., seeks change from design engineer consultants to technical sales engineer. Experienced in dealing with clients, architects and contractors.—Box 9532.

ELECTRICIAN completed contract in Africa as supervisor seeks post overseas. Very keen.—Box 9538.

SALES representative, experience and qualifications domestic appliances, sound connection electrical boards, wholesalers, contractors, good turnover, car, phone, requires appointment.—Box 9541.

SUPERVISING maintenance electrical engineer, M.A.S.E.E., desires full or part time employment, supervising or otherwise. Over forty years large factory experience control equipment, motor repairs, rewinds, all classes lifts. Sheffield area.—Box 9546.

TECHNICAL representative, A.M.I.E.E., age 36 years, seeks sales management post or position as at present but arranged to eventually lead to executive appointment.—Box 9533.

ARTICLES FOR SALE

CITY OF LEEDS

THE Transport Committee of the Leeds City Council has for disposal the following Substation Equipment for which offers are invited :—

A. One HEWITTIC Mercury Arc 600-kW Rectifier and Transformer.
One HEWITTIC Mercury Arc 375-kW Rectifier and Transformer.
Two 6.6-kV, 3-phase Oil Circuit Breakers.
One 3-panel, 600-volt D.C. Switchboard, with accessories, control gear, etc.

B. Two HEWITTIC Mercury Arc 600-kW Rectifiers and Transformers.
Two 6.6-kV, 3-phase Oil Circuit Breakers.
One 5-panel, 600-volt D.C. Switchboard, with accessories, control gear, etc.

C. Three HEWITTIC Mercury Arc 375-kW Rectifiers and Transformers.
Three 6.6-kV, 3-phase Oil Circuit Breakers.
One 5-panel, 600-volt D.C. Switchboard, with accessories, control gear, etc.

Further particulars, along with conditions of sale and permission to inspect, may be obtained upon application to the undersigned.

Offers in a sealed envelope endorsed "Transport, Offers for Substation Equipment," to be delivered to the Town Clerk, Room 57, Civic Hall, Leeds, 1, not later than 10 a.m. on Tuesday, 16th December, 1958, and must remain open for acceptance for six weeks thereafter.

A. B. FINDLAY,
M.I.Mech.E., M.I.E.E., M.Inst.T.,
General Manager

1, Swinegate,
Leeds, 1.
November, 1958. 5505

WHITEFIELD MACHINERY & PLANT LIMITED

Cobden Street, Salford, 6

SLIPRING INDUCTION MOTORS
400 VOLTS, 3-PHASE, 50 CYCLES

H.P.	Maker.	R.P.M.
175	L. D. & C.	485
150	C/PARKINSON	960
150	C/PARKINSON	960
70	C/PARKINSON	980
55	E.E.C.	1450
55	L.S.E.	955
50	E.E.C.	485
50	C/PARKINSON	485
45	MET-VICKERS	1440
40	HIGGS	1440
35	B.T.H.	960
30	MET-VICKERS	975
24	HORACE GREEN	975
20	HOWELLS	1440

Telephone: Pendleton 4746

306

ELECTRICAL EQUIPMENT FOR SALE

10-kVA/10-h.p. D.C. and A.C. School or Laboratory Test Set. Output 25 to 60 cycles and 150/500 volts D.C.
Reconditioned Motors.
3-kVA, 230-volt, 1,000/1,100-cycle M.G. Set.
Diesel Alternator Sets.
562-kVA, 300-r.p.m. Alternator, 400/440/3/50 cycles.
Secondhand 5-cwt. Electric Blocks.

SOUTHERN & REDFERN LTD.
Woodhead Road, Bradford, 7
(Tel. Bradford 23871) 404

VARIABLE SPEED MOTORS

500 volts D.C., with Control Gear

One	60 h.p.	480/1450	r.p.m.
One	45 "	850/1430	"
One	40 "	950/1120	"
Six	35 "	480/1450	"
One	35 "	900/2000	"
One	30 "	500/1500	"
Twelve	25 "	850/1420	"

JAMES GRANT & CO.
480, Pollokshaws Road, Glasgow, S.1
5383

CLASSIFIED ADVERTISEMENTS ARE PREPAID

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., 1/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

350-h.p. INDUCTION MOTOR

OFFERS are invited for one MATHER & PLATT 350-h.p., 400-volt, 3-phase, 50-cycle Induction Motor, with ALLEN WEST Starter, B.I. Condenser and CANTIE Isolator. Inspect at Thomas Taylor & Brother Ltd., Victoria Mills, Wallgate, Wigan, Lancs. 5455

HOUSE SERVICE METERS

200-240-v. A.C. or D.C., 10 amps. capacity, quarterly type, from 25s. each, plus 2s. 6d. carr.

UNIVERSAL ELECTRICAL CO.
221, City Road, London, E.C.1 37

A.A. ELECTRICAL Co. for A.C.-D.C. motors, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—CHI. 5105. 67, Rothschild Rd., London W.4. 57

A BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C. and D.C. 1/- slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675 kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-588 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

AVERY electrodynamic balancing machine, type 726, capacity 3 oz.—20 lb. Almost new. £420.—Box 9543.

BARGAINS in electric motors from A. Cookesley & Co. Ltd., 21/25, Tabernacle Stfeet, London, E.C.2. Ring Monarch 3355. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co., Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS and motor-alternators, 24, 110 and 220 v. D.C. to 230/1/50 A.C., 300 watts to 6 kVA in stock.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

D.C./A.C. motor alternator set, 1,500-r.p.m. 32-h.p., 460-v. motor directly coupled on C.I. bedplate 25-kVA alternator, 400/440/3/50, starter control panel, A.V.R., £195 o.n.o.—Parker, 9/11, High Street, Sheerness. 406

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

***Articles for Sale** (continued)*

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E.R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 111

ENGLISH leatheroid, 1½ tons in sheets 25 × 40 and 25 × 45, 7 mils thick at 2s. lb.—Loescher, 76, Albemarle Road, Beckenham, Kent. 63

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues. — The Anglo-American Electrical Company, Olive Street, Bury, Lancs. 245

FLUORESCENT tubes reconditioned and guaranteed as new for 7s. 6d. each. Free collection and delivery in Lancs and Yorks.—The Anglo-American Electrical Company, Bury New Road, Breightmet, Bolton, Lancs. (Telephone, Bolton 7251). 212

FOR immediate sale, the following D.C. 440-480-volt motors: one 350 h.p., 235 r.p.m.; one 300 h.p., 222-250 r.p.m.; one 500 h.p., 245 r.p.m. For inspection write—Box 5426.

FOR sale, mercury arc rectifier, maker Hackbridge-Hewittic, input 400 volts, 3-phase, 50 cycles, output 230 volts D.C., 80 kW. B.T.H. variable speed commutator motor, 400 volts, 3-phase, 50 cycles, 40/8 h.p., speed 1,150/230 r.p.m.—Box 5405.

FOR sale, motor generator, rotary converter and Ward Leonard sets in a great range of outputs, speeds and control systems.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 161

FOR sale, Siemens internal telephone system, 10 extensions, in working order. Apply—R. Alger & Sons Limited, 160, Dock Street, Newport, Mon. 5506

FOUR 575-h.p., 490-r.p.m., 3,000-volt, 3-phase, 50-cycle, B.T.H. squirrel cage, totally enclosed vertical motors.—A.A. Electrical Co. Ltd., 67, Rothschild Road, Chiswick Park, London, W.4 (Chiswick 5105). 5424

FRACTIONAL h.p. motors, new, ex stock, A.C./D.C., Universal, B.T.H., Delco-Remy, G.E.C., Fracmo, Newman, Scophony. — Jeary Electrical Co. Ltd., 5, Lamb's Buildings, London, E.C.1. 126

FREQUENCY changers and variable frequency M/A sets in stock, and to specification.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 148

GENERATING plants of all types, new and reconditioned up to 100 kVA in stock. Special plants built to order at short notice; automatic mains failure, etc. — Powerco Ltd., 312, York Rd., London S.W.18 (VAN. 5234). 151

GENERATING sets for sale, petrol, diesel and steam, from 1 kW up to 700 kW, A.C. and D.C. switchboards.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 163

HIGH frequency alternators and converters, 400 to 2,600 cycles up to 6 kVA in stock. Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 149

MOTOR generator sets and converters, all sizes and voltages from ½ kW up to 500 kW in stock. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, City Road, London, N.1 (Tel. Clerkenwell 5512, 5513 & 5514). 12

MOTOR generators of all types in stock and to specification up to approx. 100 kW.—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 152

MOTORS and control gear, huge stocks all types, ½ to 200 h.p.—Ramsbottom & Co. Ltd., Elec. Engineers, Keighley (3774/5/6). 70

NAMEPLATES, engraving, diesinking, stencils. — Stilwell & Sons Ltd., 153, Far Gosford Street, Coventry. 108

PHASE converters, single to three-phase, several sizes in stock up to 90 h.p., 3-phase loading. — Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 29

PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. and D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 40

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 36

PURLEY chokes and ballasts. Our 80-w. tapped h.p.f. ballast with starter switch-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject. — F. F. Blanshard Ltd. (Dept. ER), Purley, Surrey (Uplands 4818/9). 52

QUARTERLY credit meters, single and poly-phase, 2½-100 amps. From 17/6d. Also D.C. See Television.—Tradex, Surbiton. 171

ROTARY converters in stock, all sizes; enquiries invited. — Universal Electrical, 221, City Road, London, E.C.1. 34

SECONDHAND electrical plant can be as good as new if you buy it from specialists. Write for our stock list.—Dynamo & Motor Repairs Ltd., North End Road, Wembley Park, Middlesex (Telephone, Wembley 3121); Soho Road, Handsworth, Birmingham (Telephone, Birmingham Northern 0898). 73

SLYDLOK fuses for sale.—Ryness Supplies, 37, Goodge Street, London, W.1. 284

SMALL BR screws and nuts in steel, brass and stainless steel, from stock.—Premier Screws & Repetition Co. Ltd., Woodgate, Leicester. 180

TELEVISION slotmeters and time switches. Details from: Tradex Meter Co., Surbiton. Elmbridge 4487. 172

TIME switches from stock. Reconditioned or new. 12 months' guarantee. Lists from—J. W. Hughes, 3, St. Thomas Street, London Bridge, London, S.E.1 (Tel. HOP 2759). 178

TRANSFORMER by Hackbridge, 30 kVA, primary 400 v./3/50, 43 amps., sec. 110 volts, 1-ph., 50 c., 273 amps., Ser. No. 42305, with ammeter, £35 (o.n.o.).—Drake & Fletcher Ltd., Maidstone, Kent (Ref. AW/ELEC). 5425

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Rd., London, E.C.1. 38

WARD Leonard motor generating sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

2 70-kVA alternators, 240 volts, 50 cycles, single-phase, driven by General Motors 6-cylinder two-stroke diesels. Electric starting. Full control panel. Running order. — G.Q., Stadium Works, Woking, Surrey. 5519

100 dozen G.E.C. white wood blocks, 4½" × 1" (new), 4s. doz.; Electric lamps (best-known makes), ex-Govt., brand new, 15, 25, 40 w., standard voltages, 9d.; special voltages and numerous other lamps on enquiry. Torch bulbs from 6s. per 100.—Sunlex Lamps Ltd., 239, High Holborn, London, W.C.1. 5507

400-cycle to 1,500-cycle motor alternators and alternators.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 27

400-kW, 220/230-volt D.C. rotary converter with 6,600-volt, 3-phase, 50-cycle transformer, H.T. switch, starting and control panels. Inspection on site invited. Offers to—Box 5438.

500-kW, 220-volt Met.-Vick. rotary converter, with transformer 11,000 volts, 3-phase, 50 cycles, and accessories.—Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 17

EQUIPMENT FOR HIRE

GENERATING set hire service. Consult the most experienced firm for A.C. and D.C. units from 2 kW to 240 kW, diesel or petrol, stationary or mobile, sale or hire. 24-hr. breakdown service. — Dawson-Keith Ltd., Hillview Rd., Sutton, Surrey (Fairlands 4401). 46

RELIABLE, self-contained diesel electric generating sets for hire, 2.5 to 260 kW. Night and day maintenance service. Quotations by return. — Whitetrade Limited, Rochester, Kent (Tel. Chatham 41133, 3 lines). 294

ARTICLES WANTED

ELECTRIC motor wanted, 75/100 h.p., 3-phase, 415 volts, 360 r.p.m., ball-bearing machine. Offers with fullest details and outline drawings to—Box 5498.

HARRINGTON & Sons, reclamation contractors, want redundant A.C./D.C. electric motors and transformers, stocks of cable, etc.—109, Beaconsfield Street, New Beckton, East Ham, London, E.6 (ALB. 1388). 315

QUICKSILVER & beryllium copper urgently required for best prices and prompt cash.—Sterling Products Ltd. (Ealing 9248). 293

SURPLUS laminations, enamel copper wire, screws, nuts, flex. Good prices paid. Full details to—Box 199.

WANTED, D.C. and A.C. ball-bearing motors, motor generator sets, dynamos and alternators. Full details to — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 13

WANTED for prompt cash, ferrous and non-ferrous scrap, also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. & H. Cooper Ltd., 176, Brady St., Bethnal Green, London, E.1. 120

WANTED, rotary converters, any sizes.—Universal, 221 City Rd., London E.C.1. 35

WANTED, surplus stock cable, all types and sizes. We can inspect.—Box 220.

WANTED, two mercury arc rectifiers, 400 volts, 3-phase, 50 cycles, 230 volts D.C., 25 and 50-kW capacity, and two 3/3-phase, 50-cycle transformers, primary 400 volts, secondary 110 volts. One 750 kVA, one 1,500 kVA.—Whitefield Machinery & Plant Limited, Cobden Street, Salford, 6 (Tel. PEN. 4746). 5406

AGENCIES

AGENTS REQUIRED FOR MIDLANDS AND LONDON AREAS

ELECTRICAL and Mechanical Engineering Company in N.W. England are interested in appointing Agents in Midlands and London areas. Products include Motors, Transformers, Marine Equipment, also wide range of general and electrical equipment, including complete plant installation work. Emphasis will be on special equipment and application as opposed to completely standard products.

We are only interested in agents with adequate technical qualifications and experience in this class of work.

Full details, please, to—

Box 5439

POLYTHENE and P.V.C. cables to B.S.I. specifications and other types. Competitive prices. Agent wanted for the Midland area.—Box 5508.

WORK WANTED AND OFFERED

A.C. and D.C. motor rewinds and repairs. Prompt service, fully guaranteed.—Edgware 5566/9; Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. 92

DO you use magnetic core pins made from Swedish iron to close limits? We are just completing a batch of 33,000 and have available immediate capacity; contact us for a sample component which has been supplied, drilled, milled, tapped and surface ground for 7d. each. Low overheads, low prices; good work, good delivery.—Wrico Engineering, 130a, Larkhall Lane, London, S.W.4 (Tel. MACaulay 4216). 9534

METAL spinnings to your requirements. A.I.D. approved. — Martin-Golod Ltd., Maybury Gardens, London, N.W.10 (WILlesden 3888). 377

METALWORK. All types cabinets, chassis, racks, etc., to your own specifications. Write—Dept. 'S,' Philpott's Metal Works Ltd., Chapman Street, Loughborough. 211

EDUCATIONAL

CITY and Guilds (Electrical, etc.) on "No pass—No fee" terms. Over 95% successes. For details of modern courses in all branches of electrical engineering, applied electronics, automation, etc., send for our 148-page handbook—free and post free.—B.I.E.T. (Dept. 12a), 29, Wright's Lane, London, W.8. 100

CLASSIFIED ADVERTISEMENTS ARE PREPAID

BUSINESS OPPORTUNITIES

£500,000 AVAILABLE

to purchase an old-established business in any trade.

Present management can remain.

Write in confidence to

Reginald Terrell
BUSINESS BROKERS LIMITED
46, St. James's Place, London, S.W.1
Telephone: HYDe Park 1678

355

BOOKS, INSTRUCTIONS, ETC.

"RADIO Circuits: Step-by-Step Survey of Superhet Receivers." 3rd Edition. By W. E. Miller, M.A. (Cantab.), M.Brit.I.R.E., Editor of "The Wireless and Electrical Trader." Although this book deals mainly with the superhet receiver it is equally applicable to the straight set. The circuit of the superhet is dealt with section by section up to the complete receiver. 5s. net from all booksellers, or 5s. 9d. by post from Iliffe & Sons Ltd., Dorset House, Stamford Street, London, S.E.1. C10

"SHORT-WAVE Radio and the Ionosphere." By T. W. Bennington. This book shows how existing ionospheric data can be applied to everyday problems of short-wave transmission and reception. 2nd Edition. 10s. 6d. net from all booksellers. 11s. 4d. by post from Iliffe & Sons Ltd., Dorset House, Stamford Street, London, S.E.1. C7

DOMESTIC WATER HEATING

Basic Engineering Principles of Electric and Solid-fuel Installations.

THIS book, by Ronald Grierson, M.I.E.E., M.I.MECH.E., sets out the principles of domestic water heating and provides a critical analysis of current practice in the supply of hot water for domestic purposes.

The author applies sound engineering principles to the design of water heating plant of the solid-fuel/electric type, thereby increasing efficiency and decreasing running costs. He deals mainly with the combination of an electric immersion heater and thermostat with a conventional hot-water storage tank, in conjunction with a coal- or coke-fired domestic water heater, this being arranged either as a "back-boiler" or as an independent unit. A suitably arranged installation of this type does, he contends, dispose of the widespread notion that "electric water heating is convenient but expensive."

25s. net. *By post 26s.*

Obtainable from all booksellers or direct by post from: The Publishing Dept., Dorset House, Stamford St., London, S.E.1. Send for the list of titles available.

Essential to all in the electrical industry

ELECTRICAL WHO'S WHO 1958 - 59

When the first edition of ELECTRICAL WHO'S WHO appeared in 1950 it was hailed as a reference book which met a long-standing need.

The fifth edition of this comprehensive personal directory contains some 8,000 biographies of people in all branches of the industry, showing education, training, careers to date, membership of associations and private addresses, with an additional alphabetical listing of firms and organizations in the industry, with their principals.

The 1958-59 ELECTRICAL WHO'S WHO should be on YOUR desk.

27s 6d net BY POST 29s 3d

NOW READY

from leading booksellers

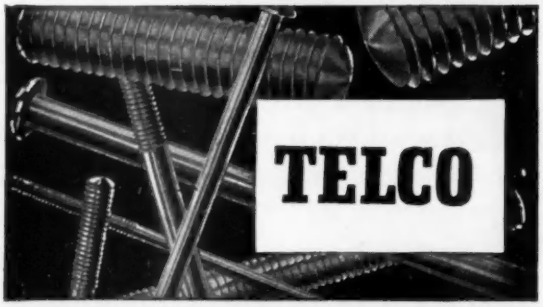
Electrical Review Publications Ltd. Dorset House Stamford Street London S.E.1

KENT

ELECTRO-CERAMICS

Low Tension – Refractory – Kenlosite (Sintered Alumina) and Cordent (cordierite Bodies) Electrical porcelains supplied to standard designs or to your special requirements. Enquiries on all electro-ceramics are welcome. 'Phone or write for illustrated brochure.

WILLIAM KENT (Porcelains) LTD.
BURSLEM, STOKE-ON-TRENT
Tel. 84237/8/9 Stoke-on-Trent Grams: KENELEC Stoke-on-Trent



Studding · Studs · Allthreads · Tie Rods
TELCO LTD., 3 Newman Street, London, W.1 MUSeum 5701/4

TRANSFORMERS of all types up to 25 kVA for Single or Three Phase operation, Phase Conversion, etc.

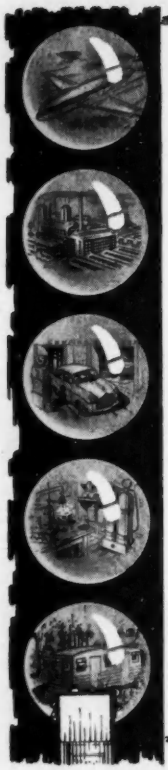
INDUCTA

COILS for Contactors, E.M. Brakes, Air Valves, etc. and COIL WINDINGS for all purposes.

MAINS Output, and Special Purpose Transformers for Radio Equipment, Chokes, etc.

SOLENOIDS for A.C. and D.C. Operation A.I.D. APPROVED

W. F. PARSONAGE & Co LTD
INDUCTA WORKS
PARK RD BLOXWICH WALSALL
TELEPHONE: BLOX. 66464



CAN YOU PAINT BUBBLES?

For detecting leaks this is the simplest and quickest method! One liberal application of SPOT-LEAK, by brush or spray, and a leak becomes immediately visible, giving off either a frothing action or a cumulative succession of larger bubbles according to the degree of the leak. It will not damage metal, rubber, wood or plastics and is non-poisonous, non-volatile and harmless to skin or clothes. One application only—and no need to clean off!

SPOT-LEAK

LOCALISES YOUR LEAK TROUBLES INSTANTLY!

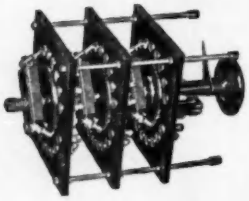
The NEW method of detecting leaks in equipment employing air or gases under pressure.

In ½ pt. and 1 pt. Polythene bottles (5/6 and 9/-) or 1 gal. tins (32/6).

By the Makers of SPECTRA-COLOR layout and indentification fluids. Full details of all products gladly sent on application.

SPECTRA CHEMICALS LTD.
SPECTRA WORKS, HIGH ST., CATERHAM, SURREY
Tel: Caterham 3182 & 2293 'Grams: Spectra, Caterham

H.B. TRANSFORMER TAPPING SWITCH TYPE L



Interlocked with micro break switch

Pull Handle to release Lock, then turn

Also Type O without interlock and Type C for on load switching

SINGLE OR MULTI POLE

Phone: Kings Norton 1604

HENLEY BURROWES & CO. LIMITED
Factory Centre: KINGS NORTON, BIRMINGHAM

MODERN ELECTRICAL CONTRACTING

HOW DOES one establish a footing in the ever-widening field of electrical contracting? This book by H. R. Taunton, A.M.I.E.E., gives the facts in every phase of contracting work from the first steps in founding or taking over a business.
The technicalities of electrical installation work are not discussed. "Modern Electrical Contracting" deals solely with the commercial side of a contracting business: its organization, economics, staff, premises, equipment, stores, stock, accounting, advertising and daily routine. Its value to the newcomer needs no emphasis, but every established contractor would do well to read it.

Published for Electrical Review 10s. 6d. net. By post 11s. 4d.
From all booksellers or direct from the Publishing Dept.:
DORSET HOUSE, STAMFORD ST., LONDON, S.E.1

motor prices!

WHAT ABOUT BROOK

BROOK MOTORS LIMITED

HUDDERSFIELD

INDEX TO ADVERTISERS

Agro Electrical Co. Ltd. 123
Aldridge Plastics Ltd. 99
Aluminium Union Ltd. 6
Appelbe, J. F., & Co. Ltd. 46
Arcolectric Switches Ltd. 47
Armstrong Siddeley Motors 1
Associated Fire Alarms Ltd. 30
Association of Steel Conduit Manufacturers 96
Atlas Lighting Ltd. ..... 9 & 15
Avo Ltd. 51

Backer Electric Co. Ltd. 47
Bayliss, Jones & Bayliss Ltd. 32
Belling & Co. Ltd. 12
Belmos Co. Ltd. 40
Benjamin Electric Ltd. 68
Beresford, James, & Son Ltd. 33
Birch, H. A., & Co. Ltd. 16
Birfield Industries Ltd. 56
Birlec Ltd. 54
Birmingham Mica Co. Ltd. 80
Birmingham Specialities Ltd. 80
Blickvac Engineering Ltd. 87
Bridge, David, & Co. Ltd. 87
Brighton Lighting & Electrical Eng. Co. Ltd. 102
British Driver-Harris Co. Ltd. 14
British Insulated Callender's Cables Ltd. 41
British Klockner Switchgear Ltd. 100
British Nylon Spinners Ltd. 8
British Refrasil Co. Ltd. 25
British Thomson-Houston Co. Ltd. 5
Brook Motors Ltd. 121
Brookhirst Switchgear Ltd. 79
Bullers Ltd. 69
Bulpitt & Sons Ltd. ..... Cover 2

Cambridge Instrument Co. Ltd. 66
Cayson Electrics Ltd. 108
Central Electricity Generating Board 36
Channel Conduits Ltd. 34
City Electrical Co. 124
Cohen, George, Sons & Co. Ltd. 62
Colne Switchgear (K & W) Ltd..... 26
Connollys (Blackley) Ltd. 82
Consolidated Pneumatic Tool Co. Ltd. 98
Cossor Instruments Ltd. 38
Crabtree, J. A., & Co. Ltd. 90
Craig & Derricott Ltd. 108
Cressall Mfg. Co. Ltd. 83
Crompton Parkinson Ltd. 58

Daly (Condensers) Ltd. 72
Dennis, G. P., Ltd. 64
Donovan Electrical Co. Ltd. 124
Dorman & Smith Ltd. 35
Downes & Davies Ltd. 52
Drummond, John (Engineers) Ltd. 100

East London Mica Works 93
Eeto Insulations Ltd. 98
Ekco-Ensign Electric Ltd. 29
Electrical Remote Control Co. Ltd. 72
Electrical Who's Who 119
Ellison, Geo., Ltd. 53
English Electric Co. Ltd. ..... 39 & 50
English Electric Valve Co. Ltd. 55
Evenshed & Vignoles Ltd. ..... 60 & 61

Ferranti Ltd. ..... Cover 1
Flexello Castors & Wheels Ltd. 19
Formica Ltd. 59
Fractional H.P. Motors Ltd. 26
Fuller Electric Ltd. 13
Furse, W. J., & Co. Ltd 122

Gambrell Bros. & Co. Ltd. 76
General Electric Co. Ltd. Cover 4 & 110
Gilby-Brunton Ltd. 46
Grelco Ltd. 100

Hampton Works (Stampings) Ltd... 25
Harboro' Rubber Co. Ltd. 33
Harris & Sheldon (Electrical) Ltd. 101
Hedin Ltd. 108
Henley, Burrowes & Co. Ltd. 120
Henley's, W. T., Telegraph Works Co. Ltd. 17
Higgs Motors Ltd. 11
Hirst Electronic Ltd. 106

Insuloid Mfg. Co. Ltd. 30
International Combustion Ltd. 42 & 43
Ioco Ltd. 94
Irish Cables Ltd. 91
Ismay Lamps Ltd. 25

Jeary Electrical Co. Ltd. 88
Jelson Electric Ltd. 102

Kent, Wm. (Porcelains) Ltd. 120
Kenwell Electric Ltd. 72

Lancashire Dynamo Electronic Products Ltd. 81
Legg (Industries) Ltd. 67
Lindley Thompson Transformer & Service Co. Ltd. 70
Litholite Insulators & St. Albans Mouldings Ltd. 104
Lodge Plugs Ltd. 66
Londex Ltd. 33

M.K. Electric Ltd. 10
Macintyre, James, & Co. Ltd. 103
Magnetic Controls Ltd. 46
Mek-Elek Engineering Ltd. 93
Mercury Switch Mfg. Co. Ltd. 83
Meritus (Barnet) Ltd. 26
Metropolitan-Vickers Electrical Co. Ltd. 18
Metway Electrical Industries Ltd. ..... 26, 54 & 122
Midland Electric Mfg. Co. Ltd. 4
Modern Electrical Contracting 120
Mole, M., & Son Ltd. 79

National Electrical Supplies Co. Ltd. 57
Newton Bros. (Derby) Ltd. 106
Nife Batteries 27
Non-Ferrous Die Casting Co. Ltd. ... 85

Oddie, Bradbury & Cull Ltd. 102

Parmiter Hope & Sugden Ltd. 109
Parsonage, W. F., & Co. Ltd. 120
Partridge Transformers Ltd. 84
Partridge, Wilson & Co. Ltd. 21
Philips Electrical Ltd. 105
Pinchin, Johnson & Co. 28
Pirelli-General Cable Works Ltd. ... 37
Plessey Co. Ltd. 95
Pope's Electric Lamp Co. Ltd. 44
Portable Furnace & Patents Co. 80
Powis, David, & Sons Ltd. 102
Precision Rubbers Ltd. 20
Presspahn Ltd. 54
Prichard, Hugh, & Co. (Nottm.) Ltd. 72
Pyrotenax Ltd. 107

Rawlplug Co. Ltd. 3
Revo Electric Co. Ltd. ..... 22, 23 & 97
Reyrolle, A., & Co. Ltd. 24
Rist's Wires & Cables Ltd. 92
Rotunda Ltd. 20
Rowlands Electrical Accessories Ltd. 2
Runbaken Electrical Products 54

Sangamo Weston Ltd. 48
Scemco Ltd. 52
Service Electric Co. Ltd. 124
Sheffield Twist Drill & Steel Co. Ltd. 45
Siemens Edison Swan Ltd. 74
Sifam Electrical Instrument Co. Ltd. 124
Simmonds Bros. 88
Simmonds & Stokes (Niphan) Ltd. 88
Simplifix Couplings Ltd. 94
Smith, Frederick, & Co. 63
Souplex Ltd. 88
Specialities Ltd. 79
Spectra Chemicals Ltd. 120
Spicers Ltd. 89
Standard Telephones & Cables Ltd. 71
Sterling Cable Co. Ltd. 78
Sturdy Electric Co. Ltd. 104
Sturtevant Eng. Co. Ltd. 7
Sunvic Controls Ltd. 16

T.M.C.-Harwell (Sales) Ltd. 31
Teleo Ltd. 120
Telcon-Magnetic Cores Ltd. 98
Tetra Eng. Co. Ltd. 103
Thermal Elements 122
Thermostatic Controls Co. 57
Transformer & Electrical Co. Ltd. 83

Universal Electrical Co. 122
Utilities (London) Ltd. 123

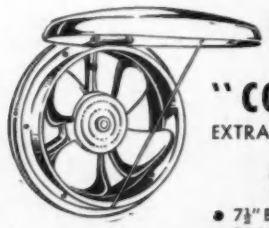
Varilectric Ltd. 67
Vernier Mfg. Co. Ltd. 34
Volex Electrical Products Ltd. 73
Vulcanised Fibre Ltd. 86

Washers Ltd. 124
Watches of Switzerland Ltd. 80
Weekes, L. (Luton) Ltd. 76
Weir Electrical Instrument Co. Ltd. 104
Wheeler, F. H., & Co. Ltd. 33
Winter Trading Co. Ltd. 75
Wootton & Co. Ltd. 19
Worthington-Simpson Ltd. 49

Yorkshire Imperial Metals Ltd. 77

Zenith Electric Co. Ltd. 84

Advertisement copy and blocks for printing in black and white should reach us 16 days preceding date of issue addressed to Electrical Review, Dorset House, Stamford Street, London, S.E.1



METWAY

present

"COOLERWAY"

EXTRACTOR WINDOW FANS

£5 19 6

- 7½" BLADE. 16,000 CU. FT. PER HR.
- DRAUGHTPROOF COVER.
- RUSTPROOF. WHITE ENAMELLED.
- 25 WATT. 200/250 V A.C. ONLY.
- GUARANTEED 12 MONTHS.

★ *FOR FULL DETAILS AND DISCOUNTS ASK FOR CAT. No. DAR/12ER.*

METWAY WORKS · KEMPTOWN · BRIGHTON

HOUSE SERVICE METERS

Credit Pattern and Prepayment Type

200-240 v. A.C. S/Ph 50 c. (& D.C.)

AVAILABLE FROM STOCK

POLYPHASE 400-440 v. 3-Wire Type

Ex Stock

UNIVERSAL ELECTRICAL CO.

217-221 City Road, London, E.C.1

THERMAL ELEMENTS

- CERAMICS
- INSULATORS
- INDUSTRIAL ELEMENTS
- TERMINAL BLOCKS
- DOMESTIC ELEMENTS

STATION WORKS
WHYTELEAFE, SURREY
Telephone : Uplands 5285

FURSE

LIGHTNING CONDUCTORS

and Earthing Equipment

Largest Manufacturers and Exporters in Great Britain

Advisory and technical information service free — complete schemes and estimates. Illustrated literature on request.

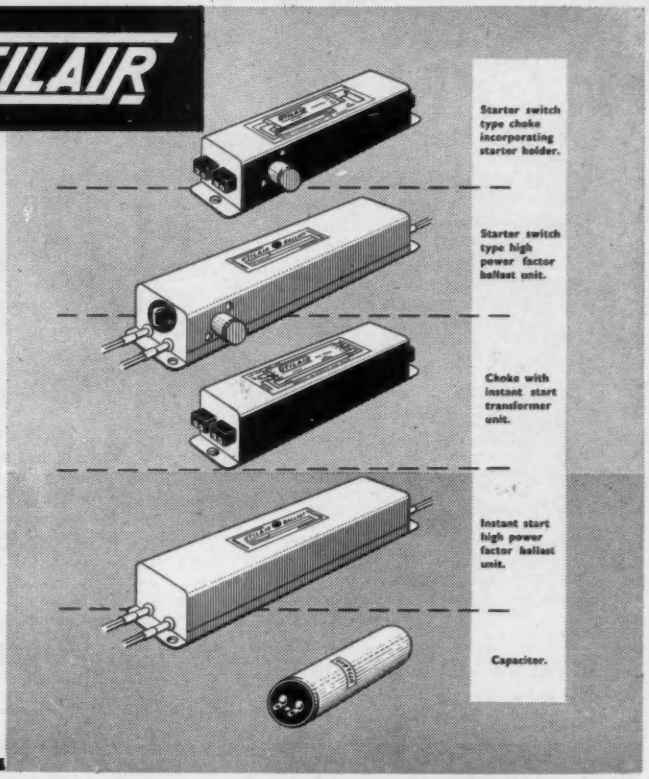
W. J. FURSE & CO. LIMITED

33 Traffic Street (Tel. 83471-5 lines) NOTTINGHAM
Also LONDON, MANCHESTER, BIRMINGHAM, BRISTOL

BRITAIN'S BEST
Fluorescent Control Gear
UTILAIR

All types 20/80 watt,
single and twin
available from stock

Unquestionably
the best for
PERFORMANCE
RELIABILITY
VALUE FOR MONEY


Starter switch type choke incorporating starter holder.
Starter switch type high power factor ballast unit.
Choke with instant start transformer unit.
Instant start high power factor ballast unit.
Capacitor.

UTILITIES
(LONDON) LIMITED
Tunstall Road, Brixton, London, S.W.9
Telephone: BRIxton 6811-2-3
Telegrams: "Utilon, London, S.W.9"

AGRO ELECTRICAL CO. LTD., 60-66 WARDOUR ST., LONDON, W.1. Phone: GERrard 0721/2. Works: AYLESBURY, BUCKS.

Hi there! seen the Secomak REGD Hi-Velocity A.C. BLOWERS & SUCTION FANS?

A brilliant addition to the Secomak range, Hi-Velocity is a high pressure, high performance centrifugal fan, designed **for continuous duty. It needs little if any maintenance.**

Induction motor driven, it is lighter and smaller than the conventional A.C. type hitherto necessary to give an equivalent performance. Capable of water gauge pressures from 1″ to 30″ and of air volumes from 5 c.f.m. to 350 c.f.m. the Hi-Velocity costs less to install and run than fans of equivalent ratings.

There are very many applications in industry where these HI-VELOCITY suction and blower fans will be found indispensable.

Our wide experience is at your disposal.

For illustrated leaflet, write or telephone Dept. E.R.

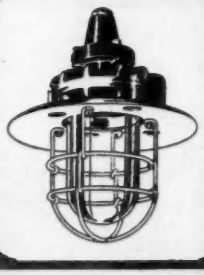
SERVICE ELECTRIC CO. LTD., HONEYPOT LANE, STANMORE, MIDDX. *Tel.: EDGware 5566-9*

WASHERS LTD.

93·IRVING STREET
BIRMINGHAM 15
MIDLAND 1423

CONTACT
DONOVAN
FOR ALL ELECTRICAL WHOLESALE SUPPLIES

FLAMEPROOF FITTINGS



Contractors and Retailers should contact DONOVAN for prompt service

THE DONOVAN ELECTRICAL CO. LTD. (WHOLESALING DIVISION)
GRANVILLE STREET, BIRMINGHAM 1 Phone: MIDland 5683

SIFAM ENGLAND

The 6-inch rectangular moving coil instrument shown is only one from a wide range of high-grade instruments of all types and sizes, described and illustrated in the Sifam Catalogue.

Write now for Data sheets mentioning your requirements to:—

SIFAM ELECTRICAL INSTRUMENT CO. LTD.
LEIGH COURT, TORQUAY
Telephone 4547/8

FREQUENCY CHANGER
50/400 cycles

CITY ELECTRICAL LONDON
STOCK DELIVERY

EMERALD STREET, LONDON, W.C.1. HOLBORN 9722

Published by ELECTRICAL REVIEW PUBLICATIONS LTD., at Dorset House, Stamford Street, London, S.E.1
and printed in Great Britain at THE CHAPEL RIVER PRESS, Andover, Hants.

do you know that

NUMBER 3

the "topping up" routine is reduced by 5 times by using CATYLATORS in conjunction with

CYCLOC AUTOMATIC FLOAT CHARGERS

what is a *Catylator*

Briefly a Catylator is a scientific device which is fitted in place of the filler caps of an enclosed type, Acid or Alkaline, battery.

It contains a catalyst which converts the gases, Hydrogen and Oxygen, given off from the electrolyte, back to water and returns it to the cell.

This reduces "topping up" to losses by evaporation only, at the same time preventing the presence of explosive gases and the spread of corrosion caused by gas bubbles.

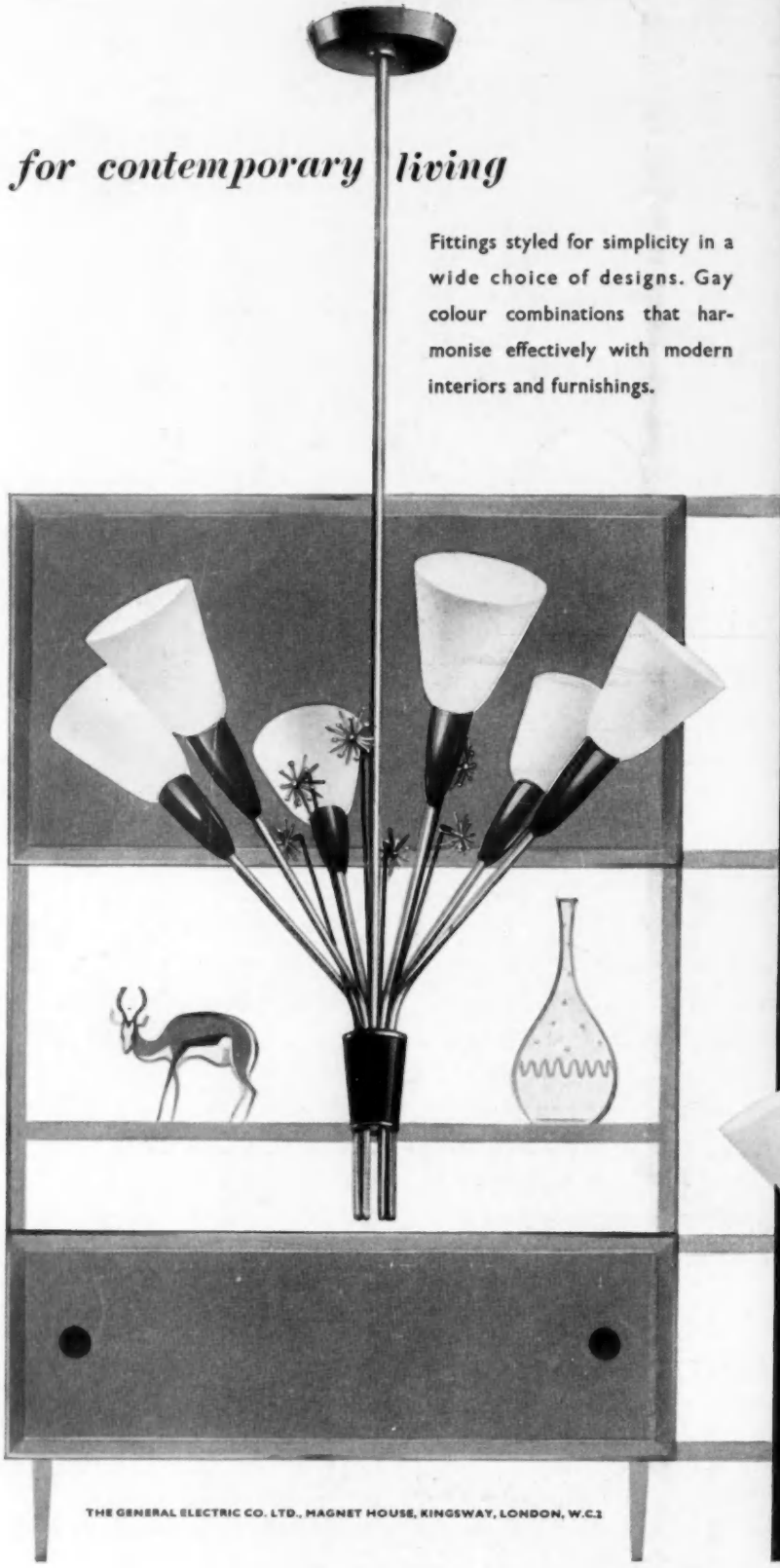
CATYLATORS ARE MANUFACTURED BY
CATYLATORS LTD., WEYDOWN ROAD, HASLEMERE, SURREY
Telephone: Haslemere 1345/6

FOR RELIABILITY AND ECONOMY INSTALL

CYCLOC AUTOMATIC FLOAT CHARGERS

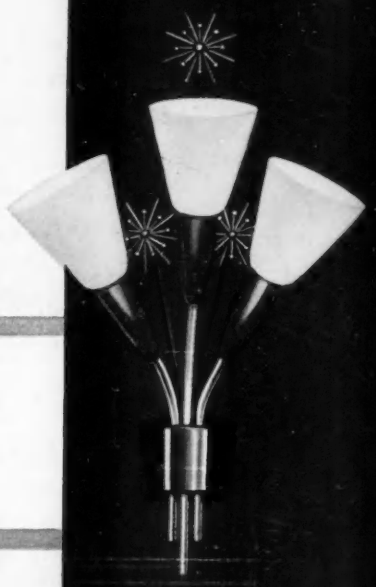
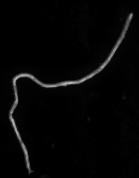
for contemporary living

Fittings styled for simplicity in a wide choice of designs. Gay colour combinations that harmonise effectively with modern interiors and furnishings.



contemporary lighting fittings by

G.E.C.



THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2